JUN 17 1933

The ELECTRICAL REVIEW

FOUNDED 1872

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The
# Electrical Review

VOL. CXII. JUNE 9, 1933. No. 2898.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY. Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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## Reorganisation at Last!

IT is with great satisfaction that we report that at the meeting referred to last week ("A Bigger E.D.A.," p. 766) a scheme submitted by the Central Electricity Board to the Council of the Electrical Development Association was unanimously adopted.

We have watched the growth of the organisation from its birth, have appreciated the value of the work of its three directors, its other leading personnel, its Circles and its Committees, but its weaknesses and drawbacks have been so obvious that never once have we seen it capable of performing to the full the service that the electrical industry needed. The main reason for its insufficiency has always been lack of funds. The imperative necessity for removing this serious disability and enabling the electricity supply industry to engage in an enthusiastic propaganda movement which would reach everybody in Britain, has been urged in the ELECTRICAL REVIEW for many years. At last, we hope, strong and suitable action is to be taken. What has been happening lately is recorded in outline on another page.

Under the scheme just adopted membership of E.D.A. will consist solely of authorised electricity supply undertakings, which, together with the Central Board, will contribute according to assessment—the present basis being continued for the present. How the controlling council will be constituted is indicated in our report. It will be observed that a fundamental change is being made in the principle adopted when E.D.A. was founded, but we must remember that the movement would not have been started when it was had the different interests not then co-operated for the common benefit.

The time has now arrived for a change, and in future electricity supply interests alone will be responsible for their own business—that of increasing the sale of their own commodity. They, together with the Central Board, will find the money, thus providing, it is hoped, those largely increased resources without which united action worthy of the industry is impossible.

The reorganisation of the Association is considered by E.D.A.'s own Committee to be the only means of creating enthusiasm and providing the needed funds. Manufacturing and other associations which have provided part of the revenue in the past, are not now to be eligible for membership, but the maintenance of collaboration and good feeling between them and the Council is to be ensured by the setting up of a Standing Co-operation Committee. This seems to us a very good arrangement, and we hope that it will work well in practice.

It is confidently hoped that a great increase in the already numerous activities of the organisation will follow the strengthening of the administration. There is no time to lose in getting down to work, and the sooner the preliminaries are got out of the way the better.

When these preliminaries have been settled, measures will at once be taken to make such changes as are meant by the expression "strengthening the administration." Both common fairness and common sense will compel the electrical industry to recognise the faithful service of those who have carried its burdens in days of comparative adversity; and only the blindest folly will ignore the value of specialised knowledge and experience in equipping the new E.D.A. for its greater work. No doubt some new appointments will be made to carry us on to greater success and set Britain alight electrically, but we think it can be safely left with the Council of E.D.A. to make engagements which carry with them the fullest possible knowledge of electrical affairs and the present situation. Other qualifications, however valuable, may fail us if divorced from the electrical mind.

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**The Consumer at Home**

IT is stated that in America home-ownership is far more popular in small towns than in the big cities. Probably it is also so in this country, even in the Metropolitan area with its eight million-odd population if we may regard each of the boroughs situate a few miles away from the City as a

small town. This we may well do while existing transport arrangements render these boroughs quite as difficult to reach as many a small town from a Midland or northern city. Electricity supply and trading concerns find that the sale of domestic electrical appliances is an easier proposition in smaller areas than in the cities, because of this private ownership tendency. Recent writers comment on the importance of the point in the States where three-fourths of the population lives in 1,457 towns of 5,000 to 10,000 people. A reason advanced is the habit of the small-town housewife to centre her attention on her home for the benefit of her family and her social circle, taking less interest in pleasure and fashion than the city dweller. Her expenditure varies in kind with her habit. Propaganda on the part of the smaller undertakings should therefore yield business more readily on this account. Electrical appliances are, of course, extremely useful for immediate service in the small flat where the tenant is seldom at home, but they yield their maximum advantage and their longest load where the home-dweller takes a pride in studying long-hour comfort, and convenience combined with economy of domestic labour.

**Greenhouse Heating**

IF greenhouse heating by electricity is to become common very low rates will be necessary. Mr. R. W. L. Phillips, borough electrical engineer of Bedford, who is in charge of one of the official demonstration schemes for rural electrification, informs us that he is introducing a special off-peak tariff of 0.3d. per kWh for the purpose. The supply will be automatically discontinued between 7 and 9 a.m. and between 4 and 6 p.m. from the beginning of November until the end of February. Experiments carried out during cold weather have shown that the heat storage is enough to maintain the requisite temperature within eight degrees during the restricted hours. This appears to be quite close enough heat regulation for all practical purposes, and we should expect good business to result on these lines.

**799 Disappointed**

AN assistant engineer for Knowle Mental Hospital, Fareham, was advertised for in the ELECTRICAL REVIEW of May 5th. The " gross " salary of £230 was offered, indicating that there would be certain deductions for a temporary " cut " and for superannuation. Good technical training and practical experience in mechanical and electrical engineering were among the qualifications, and the specified age was between 25 and 35 years. The appointment has now been filled, and the result may perhaps be regarded more as a commentary upon the depressed state of general engineering than upon that of purely electrical, bad as the latter unquestionably is, while revival tarries and students continue to pour out of technical colleges. How keen was the Knowle competition, and how difficult the selection of the right man, will be imagined when we mention that the applications received numbered *eight hundred*! In most cases of this kind just now the applicants would include a number who were not engineers at all, while many would be only partly electrical; the job, being a public one, also possessed particular attractions on that account, so that some would be men seeking to " improve their position." Every one of the 800 men had to send a stamped envelope for a form of application, and the work of sorting and ultimate discrimination between qualifications must have been a very arduous one for the Visiting Sub-committee and its clerk

**Smoke Abatement**

FACTORY owners have a statutory duty to take the best practical means to prevent a nuisance arising from smoke emissions from their chimneys. The difficulty of proving a nuisance from recorded evidence has in the past placed the sanitary inspector in an invidious position, and carbon still continues to pollute the air unnecessarily and wastefully. There are now two electrical methods of preventing this. The first is the use of light-sensitive apparatus. In the larger plants the value of the coal saved would often be quite enough to pay the cost of the installation very soon. Where the plant is used for driving machinery and is too small for the expense to be covered by fuel economies, the remedy is to close it down, if—as we may expect in the future—electricity is available on reasonable terms from the public mains. These small steam plants are the worst offenders; they are rarely used for generating electricity, and so the gain will once more accrue to our own industry.

**Convention Number**

**The Annual Convention of the Incorporated Municipal Electrical Association is being held at Bournemouth next week. The June 16th issue of**

**THE ELECTRICAL REVIEW**

**will contain a report of the proceedings and a number of special articles by well-known authorities on distribution, load development and other matters of interest to electricity supply engineers and the industry generally.**

**The New Edison Institute**

THE Edison Electric Institute which is to replace the National Electric Light Association, has been holding a four days' convention in Chicago. It was presided over by Mr. George B. Cortelyou, the terms of whose inaugural address are awaited here with some interest, as the occasion was expected to be used to clarify the purposes of the new organisation. Many papers have been presented at the meetings, which were brought to a close yesterday, on subjects such as distribution costs, the Chicago Fair, and the electrical exhibit, " outages," service standards and investment, trends and developments in power stations, evaluating national co-ordinated promotional programmes, load-building opportunities in the air-conditioning field, industrial, commercial, residential and rural applications, lighting fields to explore for profit, commercialism and competition, taxation, trend of rates, and so on. So far as one can judge, the proceedings consisted almost entirely of the discussion of key topics bearing a more commercial and general complexion than an electrotechnical one. We have not an organisation on this side affording a similar platform.

**Ever Ready Progress**

THE experience of battery makers is similar to that of other members of the industry, *i.e.*, to maintain profits at the preceding year's level the output has to be very considerably increased, due to price reductions enforced by keen competition. In the case of the Ever Ready Co., Mr. Magnus Goodfellow, the chairman, told the shareholders at last week's annual meeting that although the production and sales of the company had doubled in the past two years the profit was only about 12 per cent. higher. The company, far from being sheltered and able to take things easy behind a protective duty, has been kept on the alert by home competition. Moreover, the duty on foreign batteries has actually been accompanied by reductions in the prices of the home products, so that the public is certainly getting a square deal in this direction.

# COPPER REFINING IN LANCASHIRE

THE discovery in Rhodesia of exceptionally pure copper has made it possible to produce high-conductivity copper by fire refining, without recourse to the previously normal electrolytic process. Although it is only a few months since the refining of h.c. copper was commenced on so large a scale in this country, British Copper Refiners, Ltd., the recently formed subsidiary company of British Insulated Cables, Ltd., at their refinery adjacent to the parent company's factories at Prescot, have already achieved technical and commercial success. Blister pigs having a copper content of approximately 99 per cent. are refined and cast into commercial shapes, the purity of which is between 99.93 and 99.95 per cent.

Ore containing from 3¼ to 4 per cent. copper is mined in Rhodesia by the Roan Antelope Copper Mines, Ltd. It is first treated at the mine, being crushed, ground, and concentrated by the flotation process, and, after drying, the concentrates, together with the flux, are smelted in a reverberatory furnace. The resulting matte, which in composition resembles "white metal" and contains from 75 to 80 per cent. copper, is transferred to a convertor in which it is air blown to eliminate the sulphur content and remove other impurities. The resulting blister copper is cast into pigs measuring about 27 in. by 17 in. by 3 in., in which form the metal is shipped to Prescot.

Briefly, fire-refining is the removal of the minute amounts of remaining impurities from the molten metal in a reverberatory furnace, and the essential operations, extending over

**Poling operations at the front of the furnace**

approximately twenty-four hours, are charging, two hours; melting, nine hours; blowing, five hours; poling, three to four hours; and casting, three to four hours.

## Arrangement of the Plant

The layout of the plant is in five aisles for successive operations, and allows future expansion to be made with ease. The incoming blister copper arrives either by road or rail at the blister aisle, where it is received on a narrow-gauge railway, weighed and check-weighed, and a proportion of it is drilled for sampling. The blister then passes to the charging aisle, where there are two cranes, one for charging the furnace, and the other for general service. The third aisle is occupied by the furnace itself, with a waste-heat boiler above, fuel burners at one end and provision for slag skimming and handling poling timber at the other. Next is the casting aisle with a casting wheel from which the wire bars fall into a water bosh and are removed by a conveyor to the inspection aisle where the copper is carefully examined, weighed and despatched by rail or road. The raw material is thus received at one side of the refinery and the finished product delivered at the other.

The furnace is charged with a maximum of 175 tons of metal, the blister pigs being lifted from special trucks and charged into the furnace through three side doors. The charging crane is similar to the equipment used in steel-furnace practice; it has a capacity of 2½ tons and is served by four motors, two for traversing, one for lifting, and one controlling the pusher which actually dislodges the metal into the furnace. A foot-operated electrically driven capstan hauls the loaded trucks to the side of the furnace along a track. After charging, the hydraulically operated furnace doors are sealed with clay, and melting proceeds under pulverised-fuel firing.

When the charge is molten throughout, pipes are inserted through ports in each of the three charging doors, their ends being submerged in the molten metal, and air is blown through at a pressure of approximately 18 lb. per sq. in. The object of this operation is to oxidise, scorify and volatilise the impurities in the metal. At the same time the surface of the metal is disturbed with a rabble to effect additional oxidisation. Slag formed during blowing is skimmed off the surface of the bath through the furnace front or poling door into suitable boxes. When cool the slag is broken up by means of a ball and magnet, and is culled, or hand picked, to recover the copper-rich material which is recharged to the furnace.

Poling consists of submerging the butts of green poles in the molten metal to reduce the cuprous oxide formed during blowing. This operation continues until the copper reaches the desired condition for casting, the progress of oxygen elimination being ascertained by the examination of sample buttons.

## Treatment after Melting

The tap hole is situated in the side of the furnace opposite the charging doors, and consists of a slot approximately 6 in. wide in the furnace wall. After the charge is out the hole is built up with clay and reinforced with iron bars. Prior to the commencement of the pouring, these iron bars are removed, and the clay is pierced and gradually cut down from the top to correspond with the lowering of the surface of the bath of molten metal. From the tap hole the molten copper flows to a launder, and thence to the pouring ladle to be discharged into the moulds. The ladle, suspended on forward trunnions, is lifted at the back by a motor-driven hoist. It may also be moved backwards and forwards, and a side tilting motion ensures even flows through the three lips.

The moulds, each having three depressions, are mounted on a revolving casting wheel about 27 ft. in diameter and are filled as they pass under the ladle lips. The wheel operator is stationed in a cabin opposite the tap hole, and is responsible for the manipulation of both the wheel and the ladle. In one revolution of the casting wheel a mould is, in turn, filled, cooled by under spraying with water, tipped so that the castings fall into a water bosh, brought into the vertical position, and sprayed with bone ash to protect the mould surface from the molten metal; by the time it again reaches the ladle it has been returned to its horizontal position. For cakes, billets, ingots and ingot bars the casting process described is slightly modified.

In the bosh the bars fall on to an inclined conveyor, the lower end of which is submerged in the water. After lifting the bars out of the bosh the conveyor transfers them on to a horizontal inspection conveyor on which they are examined for size and defects before being passed for weighing and shipment. In order to pass inspection, the bars must conform to rigid standards which have been laid down by the company to ensure that the physical and electrical properties of the ultimate product will easily meet the requirements of the appropriate British Standard Specifications. During casting particularly rigid control of temperature and condition of the metal is necessary. The temperature is ascertained by means of

optical pyrometers, and sample bars are taken from the production and examined for oxygen content and structure; portions of these bars are also submitted to the laboratory for chemical analysis. When casting is finished, the furnace interior is carefully examined in readiness for recharging.

### The Moulds and Furnace Construction

Moulds for use on the wheel are made of copper, and are die-cast in " mother moulds," the metal being conveyed to the latter by a side launder which is virtually an off-shoot from the main launder. The use of copper as a mould material has several important advantages; the characteristics of the metal itself, together with the large mass which may be employed, ensure cooling and solidification conditions which can be well controlled, and are particularly favourable for obtaining a structure of the desired type and a surface free from blemishes. Additionally the use of copper permits frequent renewal, and consequently the maintenance of a very high standard of mould surface—a condition essential to the production of high-grade castings.

In the construction of the furnace special refractories are used, comprising magnesite, chrome, silica and fire-clay, the individual characteristics of each material being such as to make its use economical in its particular position in the furnace. The dimensions of the bath are approximately 30 ft. long by 13 ft. wide by 2 ft. deep. Water cooling is resorted to for skewbacks and in certain other positions where the heat is most intense; the cooling system includes a natural-draught chimney-type tower and a reservoir. The central system of p.f. firing is employed, and Lancashire coal is used, being ground in a ball mill to pass at least 85 per cent. through a 200 mesh screen.

The waste-heat boiler installed above the furnace has a heating surface of slightly under 6,000 sq. ft., and is designed for a gauge pressure of 250 lb. per sq. in. It is equipped with a high-velocity type economiser and inter-deck superheater, the latter imparting a superheat of 150 deg. F. The steaming rate varies from 5,000 up to 24,000 lb. per hour, according to the period of the furnace cycle; the steam produced is used for factory purposes.

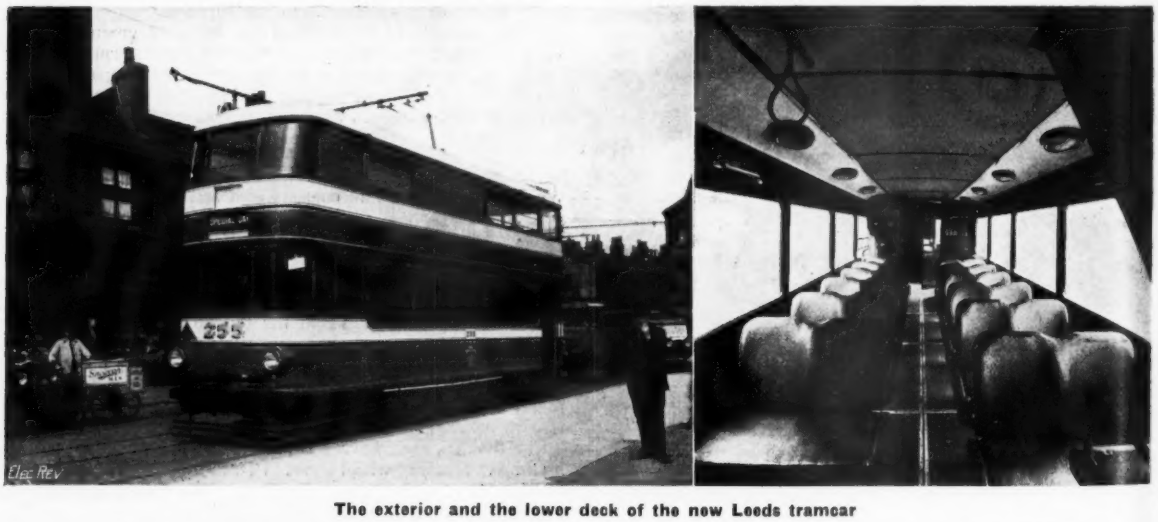
The area covered by the refinery is approximately five acres, and it is interesting to record that, although the greater part of the site had to be excavated from solid rock, the buildings and plant were completed within a period of about six months and production began at the time stipulated in the original plan.

# The New Leeds Tramcar

## A 70-seater with regenerative braking

A NEW double-deck tramcar which is now in experimental service in Leeds has been built to the requirements of Mr. W. Vane Morland, general manager and engineer of the City Tramway and Transport Department, by the Brush Electrical Engineering Co., Ltd. Because it has to pass under a low railway bridge, the vehicle height has been reduced to 14 ft. 9.5 in., while another feature of the car is that the floor level is only 2 ft. 4 in. above the rails.

The top deck cants backward, and the vestibule ends on both decks have curved glass corners, which enhance the appearance. The driver has a hinged seat in a separate compartment at each end of the car. The new vehicle is capable of seating seventy passengers, thirty below and forty on the top deck. Transverse seats are provided upstairs and down, and there is a longitudinal seat at each end of the lower saloon.




**The exterior and the lower deck of the new Leeds tramcar**

Instead of the usual four to six lamps in series system of lighting, 40-V, 40-W " Osram " lamps are fitted in series of fourteen; the failure of one lamp does not affect the others in the circuit. A pair of headlights fitted as far apart as possible is fitted at each end of the car and each has three lamps—bright, dipping, and red.

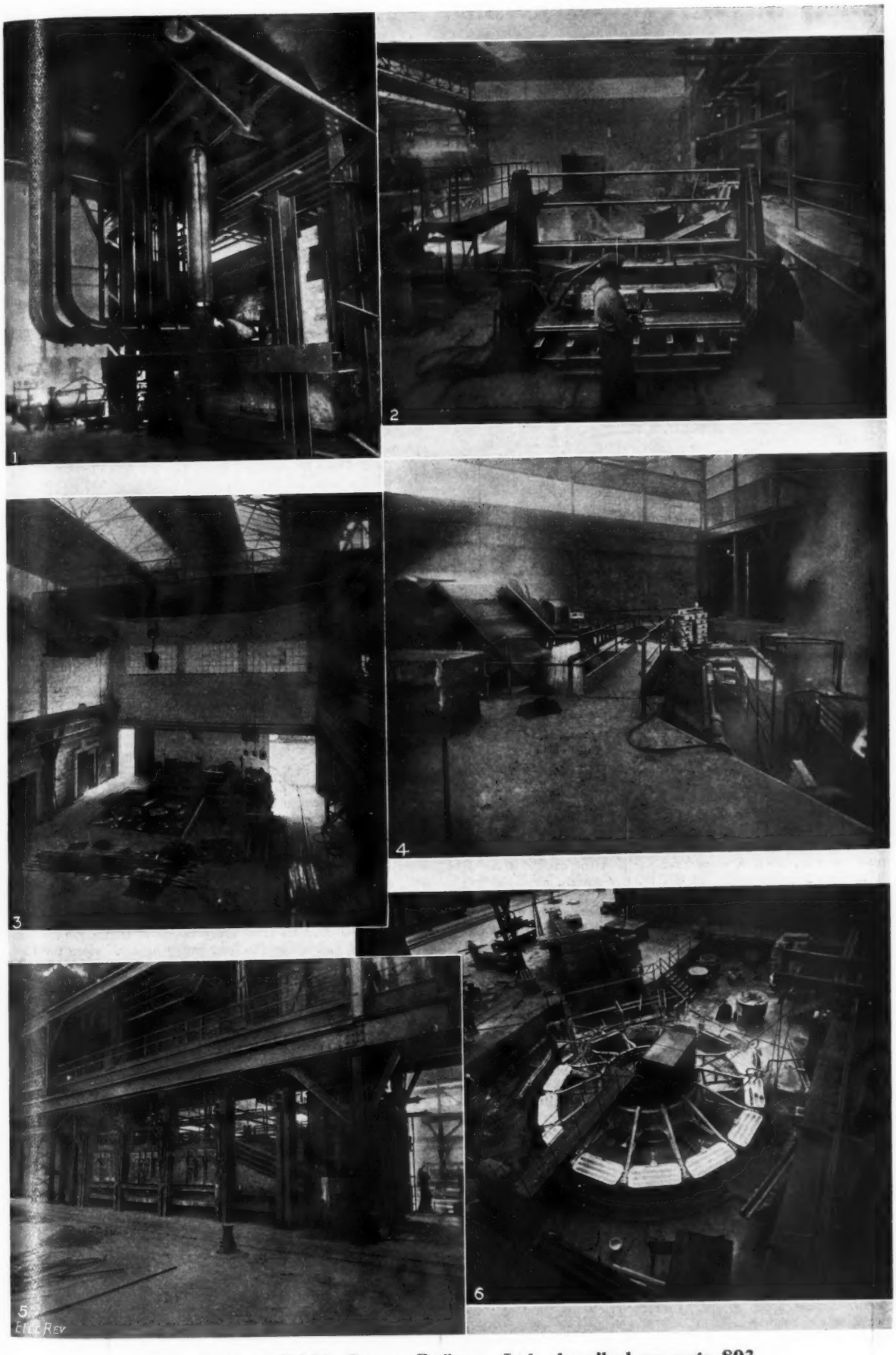
### Traction Equipment

This tramcar is the first to be fitted with " Metrovick " four-motor equipment arranged for control by regenerative and rheostatic braking. The control apparatus consists of the normal circuit breakers, controllers, and starting resistance, with the addition of eight miniature contactors and a bank of wire-wound resistance units for regulating the shunt excitation of the motors. The controllers have five series and six parallel notches on the power side, eight of them being economical running notches. There are also six rheostatic braking notches. All arcing on the main circuit is confined to a group of eight cam-operated contactors fitted with blow-out coils. The usual reverse and motor cut-out drums are provided, and a small drum mounted on the main shaft controls the shunt excitation by energising the coils of the contactors mentioned above. The top cover is chromium plated and is surmounted by a Maley & Taunton air-brake attachment.

Each of the eight economical running notches gives the driver a definite car speed corresponding to the position of the handle. The retardation of the car by means of the regenerative feature is obtained by simply moving the controller handle backwards through one, two, or more notches, depending upon the rate at which it is desired to decelerate. The full number of brake notches is provided on the magnetic brake side, and the performance of the regenerative equipment is identical in this respect with the standard form of control. In view of the economy effected it will be possible with regenerative cars to increase the scheduled speed of the route without any increase in energy consumption.

Four compound-wound motors, each 30 h.p. at 275 V on the one hour rating, are connected two permanently in series. A large oil chamber is arranged immediately above the axle bearings, and by means of the " Metrovick " patent siphon feed lubricator a correct and adequate supply of oil to each bearing is ensured, and the necessity of skilled labour for packing the bearing is dispensed with. Special precautions have been taken to ensure that the gear case will be oil tight and will efficiently protect the gears against entry of water. The armature is mounted on roller bearings, and particular attention has been paid in the design to facilitate the dismantling of the machine and the retention of grease within the bearings, which will run for periods of at least three months without attention.

The overall dimensions of the new tramcar are: length, 36 ft.; width, 6 ft. 11 in.; height, 14 ft. 9¼ in.; and length of body, 23 ft. 6 in.



**The works of British Copper Refiners, Ltd., described on page 803**

1. A furnace front showing the pulverised fuel feeders. 2. A mould press with cores in position. 3. Slag crushing by an electro-magnetically suspended "ball." 4. The "bosh" linking up casting wheel and conveyor. 5. The doors on the charging side of the furnace. 6. A bird's-eye view of the casting wheel and conveyor

# Bled Steam. By G. W. Bird, B.Sc., A.M.I.E.E.

## Principles underlying the gain in heat economy

Mr. G. W. Bird is head of the Mechanical Engineering Section of the St. Helen's Municipal Technical School (Gamble Institute)

IN the quest for improved thermal efficiency high steam pressures and high degrees of superheat are but two of the means employed. Several power stations are now operating on steam pressures of from 1,200 to 1,400 lb. per sq. in., and temperatures of over 400 deg. C., but a limit to pressure and temperature is imposed by the slow and small but continuous increase in the dimensions of metals subjected to high temperature known as "creep."

A further aid to improvement in thermal efficiency is the heating of the feed water by steam bled from the turbine at a selected point or points. Fig. 1 represents diagrammatically the arrangement of the boilers, turbine, condenser, hotwell and steam feed heater in the circuit. Steam is bled from the turbine at point A and enters the feed heater at B. In passing through the feed heater it becomes condensed and falls in temperature until by the time it has reached the exit C it has been reduced to the temperature of the condensate in the hot well. In the hot well it meets and mixes with the main condensate from the condenser, and, as feed water, begins again its circuit through the boiler and turbine. In

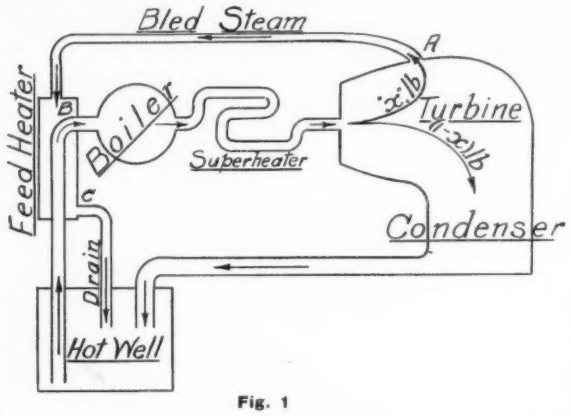



Fig. 1

passing through the feed water heater it receives the heat given up by the condensed bled steam, and may be assumed to enter the boiler at a temperature equal to that of the bled steam at entry to the feed heater at B. It will be seen that there is a heat exchange taking place in the feed heater, and, neglecting losses, the heat given up by the bled steam is equal to the heat taken up by the feed water.

The gain in thermal efficiency due to this use of bled steam may be seen from a consideration of two cases. *Case 1.* A turbine receives steam at 800 lb. per sq. in. absolute and 450 deg. C. The steam expands adiabatically down to 0.05 lb. per sq. in., and then is ejected to the condenser. *Case 2.* Steam is supplied at the same pressure and temperature as in Case 1, but, after expanding down to 60 lb. sq. in., a certain proportion of the steam is bled to heat the feed water and the remainder completes its journey through the turbine and is expanded adiabatically down to 0.5 lb. per sq. in., after which it is ejected to the condenser. Let us find in each case the thermal efficiency, using in Case 2 the proportion of bled steam which will give the maximum efficiency.

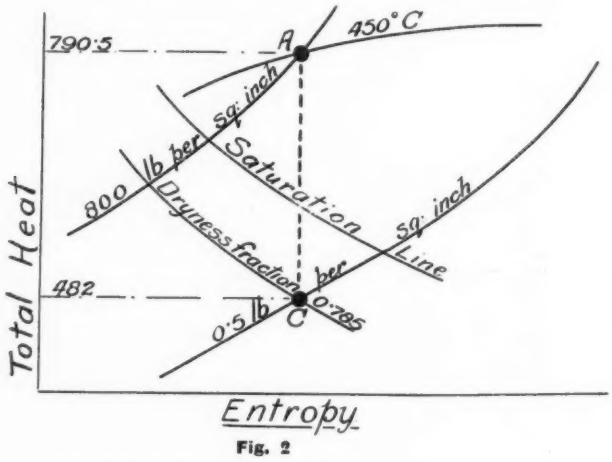



Fig. 2

Steam tables show that the saturation temperature of this steam is 270.1 deg. C., and hence the steam has been superheated 450−270.1 deg. C.=179.9 deg. C.; also the total heat in 1 lb. of this steam is 790.5 C.H.U. The usual assumption made is that the steam having entered the turbine expands adiabatically, that is, no heat, as heat, escapes from or enters into the steam whilst it expands and passes through the turbine, doing work on the turbine blades. In the solution of this problem it is helpful to use the Mollier or total heat—entropy diagram for steam. (Fig. 2.) In this diagram the point A represents the initial condition of the steam, since A is at the intersection of the 800 lb. per sq. in. line and the 450 deg. C. line. On the total heat scale we read off the total heat per lb. of this steam as 790.5 C.H.U.

### The Use of the Diagrams

In Case 1 the adiabatic expansion which the steam undergoes is represented in the diagram by the vertical straight line A C, the expansion being one of constant entropy. The end of the expansion shown by the point C is on the 0.5 lb. per sq. in. line, and on the total heat scale we read off the total heat as 482 C.H.U. The length of the vertical line AC to scale represents 790.5−482=308.5 C.H.U. This is the adiabatic heat drop and represents the amount of work which a Rankine engine would do per lb. of steam. Now 308.5 C.H.U.=308.5×1,400=431,900 ft. lb. One h.p.-hour is 1,980,000 ft. lb., and our Rankine engine would require 1,980,000/431,900=4.584 lb. of steam per h.p.-hr.

The heat expenditure necessary to enable our engine to do the equivalent of 308.5 C.H.U. is the total heat in 1 lb. of steam at the initial conditions less the sensible heat at the exhaust pressure of 0.5 lb. per sq. in., which is 26.4 C.H.U.; hence the heat expenditure =790.5−26.4=764.1 C.H.U. Thermal efficiency=work done/heat expended=308.5/764.1=40.37 per cent. In Case 2, the steam is expanded adiabatically from its initial condition of 800 lb. per sq. in. and 450 deg. C. (point A, fig. 3), down to 60 lb. per sq. in. where its condition is shown by the point B. Here its total heat=426.5 C.H.U. and, since B lies below the saturation line, the total energy as water of this wet steam can be found from the tables of properties of saturated steam to be 145.7 C.H.U. It is at this pressure of 60 lb. that from every pound of steam the fraction $x$ lb. is bled and led to the feed water heater. Here the bled steam is condensed and its temperature reduced to that of the feed water leaving the hot well, that is, 26.4 deg. C.

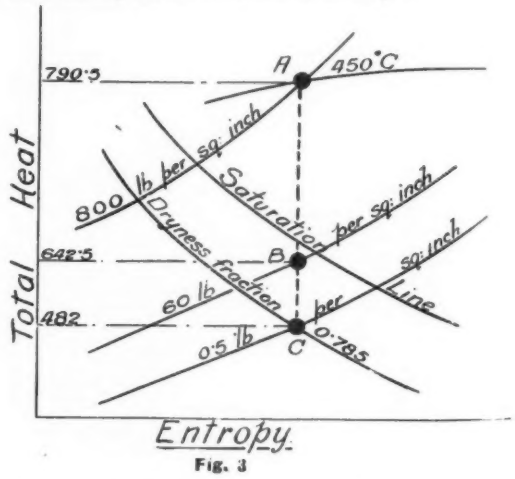



Fig. 3

The heat exchange equation for the feed heater becomes: heat given up by bled steam=heat taken up by feed water or $x$ lb. (total energy of wet bled steam at 60 lb.−total energy of water at 0.5 lb.)=1 lb. (total energy of water at 60 lb.−total

# Some Municipal Electrical Engineers

From left to right: Mr. S. G. Marston (*Thirlwell*), Stockton-on-Tees; Mr. J. R. P. Lunn (*Elliott & Fry*), Darlington; Mr. C. Turnbull, Tynemouth; and Mr. W. T. Dalton (*Jas. Bacon & Sons*), Newcastle-upon-Tyne.

**Bled Steam** (*concluded from opposite page*)

energy of water at 0.5 lb.); substituting the numerical values we obtain:—$x$ lb. $(642.5-26.4)=1$ lb. $(145.7-26.4)$ $\therefore$ $x$ lb. $= 145.7-26.4/642.5-26.4=119.3/616.1=0.1936$.

After bleeding has taken place, each original pound of steam is reduced to $1.0-0.1936=0.8064$ lb. and this continues its expansion down to the terminal pressure of 0.5 lb. per sq. in.

We can now find the work done for each lb. of steam which enters the engine. The total expansion is indicated by the line A B C fig 3, but whilst 1 lb. of steam expands from A to B, and in so doing is responsible for $(790.5-642.5)=148.0$ C.H.U. of work, from B to C we have only 0.8064 lb. of steam, so that the work done over this part of the expansion is $0.8064\ (642.5-482)$ C.H.U. $=0.8064\times160.5$ C.H.U. $=129.42$ C.H.U.

The total amount of work done during the expansion from A to C $=148.0+129.42\times277.42$ C.H.U. This is less than that done per pound of steam in Case 1, but before we can compare the efficiencies of the two cases we must determine the heat expended in this case. The feed water enters the boiler at a temperature and with an internal energy corresponding to 60 lb. per sq. in.; and referring to the steam tables we see this internal energy to be 145.6 C.H.U. per lb. The heat given to this lb. of feed water whilst it is in the boiler is sufficient to raise its total heat to 790.5 C.H.U. (point A, fig. 3); hence the heat expenditure $=790.5-145.6$ C.H.U. $=644.9$ C.H.U. This is considerably less than in Case 1. Thermal efficiency = work done/heat expended $=277.42/644.9=43.02$ per cent. The gain of efficiency is 43.09 per cent. $-40.37$ per cent. $=2.65$ per cent., which really represents a gain of 6.5 per cent. on the efficiency of Case 1.

The thermal efficiencies here calculated are much above those realised in even the most efficient power stations. Losses of various kinds, together with the deviation of the actual expansion of the steam from the adiabatic expansion assumed in our calculations, all combine to reduce the thermal efficiency. Nevertheless the figures serve to show the increase in thermal efficiency which is partly realised in practice.

In our endeavour to account for this gain in efficiency we have to remember the large proportion of the total heat supply which is carried over by the exhaust steam into the condenser, and there transferred to the circulating water and loss. So great is this loss that it has been stated that the condenser cooling water from the power stations in the vicinity of New York has raised the temperature of the sea water by 8 deg. F. and the East River no longer freezes in winter.

Referring back to the numerical examples above we see that the dryness of the steam at C is 0.785, and from the steam tables we read that the latent heat of dry saturated steam a 0.5 lb. per sq. in. abs. is 580.8 C.H.U.; hence every lb. of steam which goes to the condenser takes with it a store of latent heat $=580.8\times0.785=455$ C.H.U. and the whole of this is taken away by the cooling water and, presumably, lost. If a part of this heavy loss can be prevented an increase in thermal efficiency may be expected. This saving is effected by bleeding a fraction of the steam from selected points in the turbine and, instead of this bled steam being sent to the condenser where its latent heat would be lost it is sent to a feed water heater where its latent heat is returned to the feed water and so retained inside the heating circuit. The feed water is, in effect, a small condenser in which the circulating cooling water is the feed water en route to the boilers. The number of feed heaters employed may vary from one to four and each feed heater is supplied with steam bled from a different point along the line of the turbine. The feed water, passing through these heaters in series, has its temperature raised successively until a feed water temperature of 250 deg. C., or over may be reached.

# Earth Resistance Measurement

CONDUCTION of electricity through earth is electrolytic in character. The body of earth has no definite limits and when carrying out tests the whole of the resistance must be included in the measurement, but the resistances of the temporary earth connections must be excluded. Alternating current must be used for the test.

It is not only essential for the earth resistance to be low, but for the potential gradient in the soil, in the event of a fault, to be kept to a non-dangerous value. The potential gradient is determined almost entirely by the dimensions of the earth connection, and is not affected by the specific resistance of the soil.

In a handbook published by Messrs. Evershed and Vignoles, Ltd., recent investigations into the nature of earth resistances are described, with particulars of methods of measurement.

The majority of methods of measuring earth resistance are open to either, or both, of the following objections: (1) The resistances measured include those of one or more of the temporary earth connections; and (2) the readings obtained are upset by the presence of stray currents in the ground.

The "Megger" and "Meg" earth testers are said to overcome both these difficulties. These instruments can be used in various ways to measure earth resistances, depending on the conditions and as to whether the resistances of connecting leads, &c., can be eliminated. The temporary earth connections are usually made by spikes, which should be durable and easily portable. A description is given of a type of spike which meets the requirements.

A curve can be plotted for any earth connection, showing the variation of the total resistance to earth with the distance from the earth connection; this gives not only the total resistance to earth but also the potential gradient in the vicinity of the earth connection.

As the whole of the body of earth forming the resistance is included in the measurement, the spacing of the temporary earth connections is of very great importance. A simple rule is given by means of which it can be determined whether these are far enough from the earth connection under test.

The earth resistance of one overhead-line tower is a resultant of all the towers connected in parallel by earth wire. A description is given of a method whereby the individual resistance can be calculated from the values measured at successive towers along the line. No absolute formulæ are given for the calculation of the resistance of an earth connection, but formulæ are included for some kinds of earth connection, with particulars of these and deductions which can be made therefrom. A method of measuring the specific resistance of the earth in place is also given.

# The I.E.E. Council Nominations

THE nomination by the Council of Mr. Philip Vassar Hunter, C.B.E., as president of the Institution of Electrical Engineers for next session is as apposite as it will be popular. Exceedingly interesting developments, both technical and commercial, are now taking place in cable manufacture, and in these Mr. Hunter has played, and is playing, a notable part.

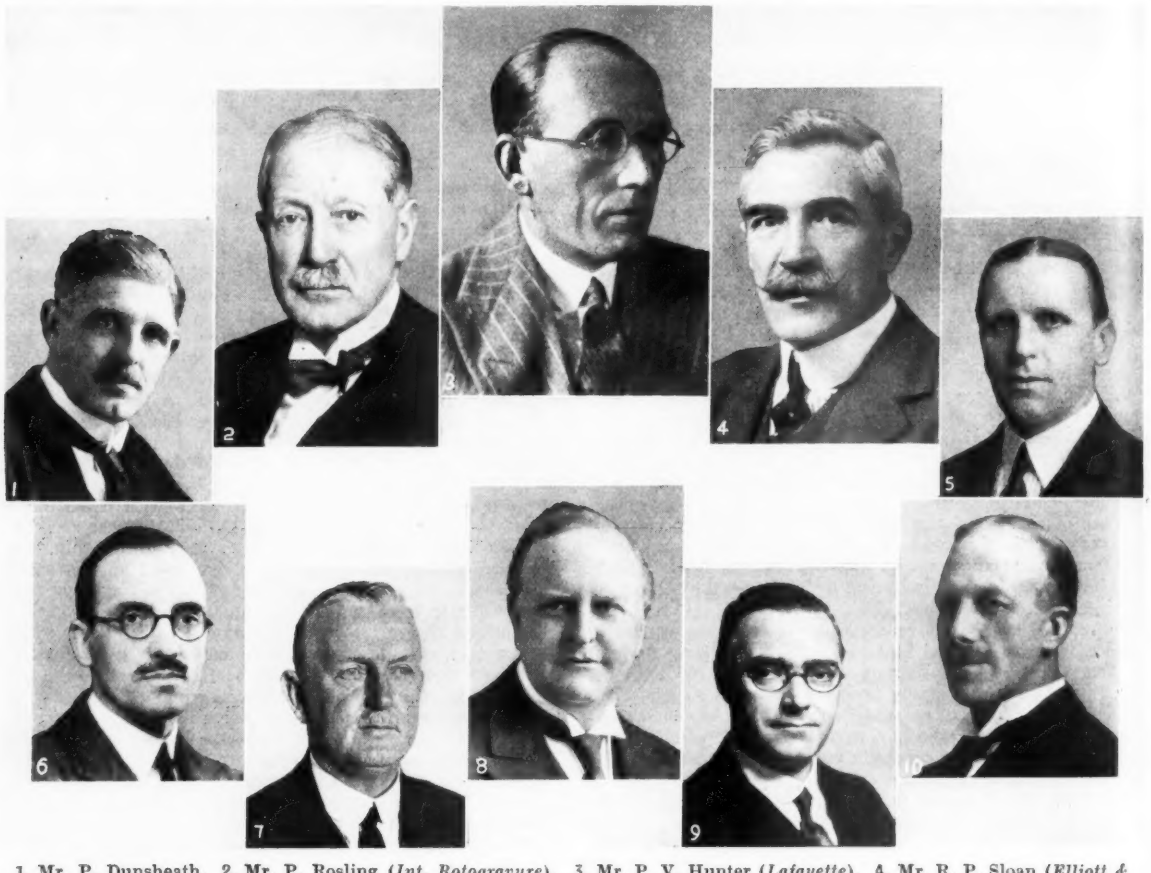
Mr. Hunter was born at Hungate, Norfolk, in 1883, so he may be regarded as a young president. He was educated at Wisbech Grammar School and received his technical training at Faraday House, serving his time with Willans & Robinson. Experience in the Great Yarmouth and Willesden supply undertakings was followed by a short period with Robert Hammond. In 1904 he joined the staff of Messrs. Merz and McLellan, consulting engineers, and was head of their electrical department until his appointment, in 1919, as joint manager and chief engineer of Callender's Cable & Construction Co., Ltd., of which firm he was made advisory director at the beginning of this year.

The name of Mr. Hunter is familiar to the majority of electrical men as the inventor of the split-conductor and other methods of protection and for investigations into the problems of large-scale transmission, but he has also taken an active interest in the multitudinous questions of his profession and industry. Thus, he has been for many years chairman of the National Register of Electrical Installation Contractors, and has served on committees of the British Standards Institution, and of the British Electrical and Allied Industries Research Association, and the International Electro-technical Commission. During the war he was engineering director to the Experiments and Research Section of the Anti-submarine Division of the Naval Staff.

He became an associate member of the Institution in 1910 and a member in 1914 and has held office as vice-president and as chairman of the North-Eastern Centre. He has contributed many papers and addresses that have been published in the *Journal*. His friends know him also as a keen golfer and a first-class shot.

A former president of the Faraday House Old Students' Association, Mr. Hunter is the fourth engineer with associations with the college to become president of the I.E.E., previous holders of the office being Mr. C. P. Sparks, Dr. Alexander Russell, and Mr. C. C. Paterson. But electrical engineers, wherever they received their training, will be at one in wishing the new president every success during his term of office and thereafter.

For the one vacancy in the list of vice-presidents Mr. R. P. Sloan has been nominated. As chairman and managing director of the huge North-Eastern Electric Supply Co., Ltd., he will bring to the Council the help of ripe judgment based upon many years of the administration of a progressive undertaking. Mr. P. Rosling has been asked to stand again as treasurer and will, we hope, have occasion to refer with the same satisfaction to the Institution's financial position next year as he did at the last general meeting. Messrs. C. S. Morley New (Cardiff) and E. E. Sharp (of Venner's) have consented to serve for another period; their experience has been helpful, the one as a municipal supply engineer (he was last year's president of the I.M.E.A.) and the other as an exponent of the value of off-peak loads and sundry metering problems. New blood on the Council is proposed in the persons of Messrs. P. Dunsheath (research and technical manager of Henley's), W. McLelland (Admiralty Director of Electrical Engineering), and Mr. Johnstone Wright (chief engineer, C.E.B.), and also in the representatives of the associate members and the associates. In the one case we have Mr. E. W. Moss (Messrs. Raworth, Moss & Cook), and in the other a name well-known in the counsels of the I.E.E., that of Mr. V. Z. de Ferranti (chairman of Ferranti, Ltd.).



1. Mr. P. Dunsheath. 2. Mr. P. Rosling (*Int. Rotogravure*). 3. Mr. P. V. Hunter (*Lafayette*). 4. Mr. R. P. Sloan (*Elliott & Fry*). 5. Mr. Johnstone Wright. 6. Mr. V. Z. de Ferranti. 7. Mr. W. McLelland. 8. Mr. E. E. Sharp (*Elliott & Fry*). 9. Mr. E. W. Moss (*Whitlock & Sons*). 10. Mr. C. G. Morley New (*Elliott & Fry*)

## The Mining Electrical Engineers' Convention

This month's convention of the Association of Mining Electrical Engineers is being arranged by its North-Western Branch with headquarters at the Imperial Hydro Hotel, Blackpool. The programme is as follows:—

*Tuesday, June 27th.*—Morning drive to Prescot to inspect the works of British Insulated Cables, Ltd. After luncheon at Liverpool there will be visits to the works of the Automatic Electric Co., Ltd., an Atlantic liner, the cathedral, or a drive round Liverpool.

*Wednesday, June 28th.*—Coach excursion to the Lake District, including a lake steamer trip, with an evening civic reception and dancing at the Winter Gardens, Blackpool.

*Thursday, June 29th.*—Coach trip to Bradford to visit the works of the English Electric Co., Ltd.

*Friday, June 30th.*—Council meeting, annual general meeting, and annual dinner, Blackpool.

# Features of the I.M.E.A. Exhibition

## A guide to the Bournemouth display

IN accordance with custom the British Electrical Development Association is organising an exhibition at the I.M.E.A. Convention which will be held at Bournemouth from Monday to Friday inclusive, next week. The public will be admitted on Monday afternoon—half a day sooner than usual. The exhibits are to be displayed on the ground floor of the Winter Garden in Exeter Road.

About fifty stands will be occupied by manufacturers, who will have supply facilities wherewith to demonstrate domestic appliances. In addition, the Electrical Contractors' Association (Bournemouth branch) will make a general display of electrical apparatus, while the Electrical Association for Women is providing an information bureau.

The Bournemouth and Poole Electricity Supply Co., which is co-operating with E.D.A. in organising the exhibition, is providing an electrically equipped lounge of modern design with an information bureau and a demonstration van in the grounds outside.

In one corner of the Winter Garden the Electric Lamp Manufacturers' Association of Great Britain will have a stand which it has planned to represent a model Lighting Service Bureau suitable for supply undertakings.

Demonstration cabinets will be arranged along the back wall to show the effect of increased illumination on the speed of vision, the improvement in appearance when glare is eliminated, the effect of the colour of light on a coloured picture, the result of diffused and directional light, the effect of room dimensions and the colour of the walls, commercial applications of daylight blue lamps, and the effect of increased illumination in assisting the eye to distinguish fine detail. In addition there will be a cabinet exhibiting the range of lamps, one showing the results of tests on E.L.M.A. and cheap lamps, and one illustrating the extra expenses involved when so-called cheap lamps are used. There will also be a special feature to display the various stages in the development of the electric lamp, and the future trend as shown by the gaseous discharge lamps.

The demonstration Diesel generating van described in our last issue (page 787) will also be on view in the grounds during the period of the Convention.

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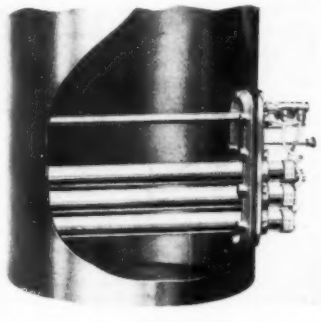
**Aidas Electric, Ltd.**

Immersion heater groups (illus.) are designed to be fitted easily to tanks of different shapes. No soldered joints are needed. The flange and counter-flange are of gun-metal, tinned, and the element and thermostat tubes are of tinned copper. The terminals and mercury switch are enclosed under a nickel-plated brass cover, and two special gaskets and ten bolts are provided for fixing.

The elements and thermostat are the same as those used in the "Sadia" automatic storage heater. Each element consists of a spiral of nickel chromium alloy passed up and down through channels in a series of porcelain bobbin insulators threaded on a centre rod. The thermostat is a mercury type of special design. The mercury tube switch is held at both ends in a clamp. It is positive in action and easily removed.



**The Aidas immersion heating group**

The elements and thermostat can all be withdrawn separately without emptying the water.

**Allen West & Co., Ltd.**

The range of manufactures of this company and its associated companies extends from small time switches to 11-kV circuit breakers and compound filled metal-clad vertical draw-out switches.

A new product is the "Neoglow" safety sign, in the form of display stands that work at any lighting voltage, whether a.c. or d.c.

A small time switch is another recent development, in which the advantages of the firm's mercury switches are utilised in conjunction with compact clock-controlled mechanism.

In larger forms of time switch mercury switches are used for change-over purposes and there are also contactor patterns. Other house service apparatus comprises electrolytic meters, demand indicators, and maximum-load controllers.

A duplicate busbar oil-immersed circuit breaker of 200 A capacity at 11,000 V will be on view as well as various portions thereof in detail.

Traction activities (under the Crompton-West system) are to be exemplified in a tramcar circuit breaker, a tramway controller, and a pedal-operated trolley-bus master controller.

Overhead line gear will include a model of the mechanism of a compensated balance pull-down switch, which can be operated with minimum effort, and remains in any position. A selection of high-voltage liquid fuses is to be shown; also "Bailey" boiler apparatus, consisting of a draught gauge, a boiler meter, and a flow indicator; together with industrial switchgear of the air-break pattern, with both thermal and magnetic-overload releases, and of the hand-resetting or self-resetting types. A section of a thermal overload release demonstrates its simplicity of design.

**Automatic Electric Co., Ltd.**

Demonstration models in miniature are relied upon to demonstrate two important products of the company. In one a bathroom has been reproduced with electrically heated water flowing from the household cylinder which has been converted to all-electric. The other is a complete working model of a cross roads equipped to demonstrate automatic street traffic control. The principal exhibit is the "Xcel" flange connector—a device which enormously simplifies and speeds up the conversion of the ordinary household hot-water cylinder to all-electric operation. Hot-water storage tanks in sizes ranging from 1½ to 20 gal. are shown and there are specimen models of a new range of "Xcel" cookers and a series of electric fires embodying the latest approved principles of combining the effects of radiated and convected heat.

**Barker Young & Co., Ltd.**

Tubular heaters incorporating the company's latest developments with regard to terminal arrangement and fixing brackets will be given prominence, a "Unity" four-bar radiator, towel airer, linen cupboard, and a combined heat and light unit being also displayed.

Heating panels are made of the "Electrorad" and "Morganite" types for low and medium temperatures respectively. The company's water heaters (illus.) are all of rectangular shape and the larger sizes are of a patented twin-cylinder construction. Air and comfort thermostats will be on view.

**Bastian & Allen, Ltd.**

Besides a sample of the displacement-type water heaters, an electrode circulator will be shown, rated at 110 kW, 400-V, 3-phase, 50-cycles, complete with hydraulic load control, which arrangement will maintain any given load irrespective of the alteration in conductivity of water due to changing temperature.

The setting of the boiler is automatically reduced to minimum loading when switched off, so that the full load is not switched on when heating is next required, but the load is built up gradually to the amount for which the controls are set.

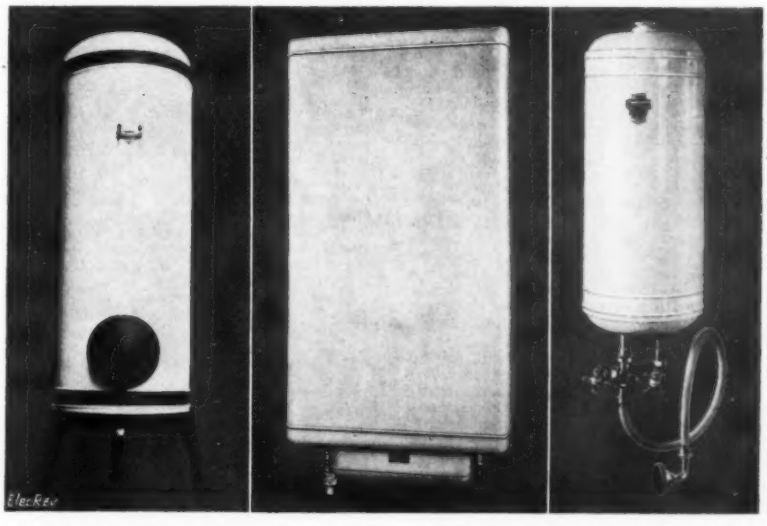
This circulator is the one which the company is installing in the new Bournemouth electricity showrooms.

Illustrations will also be on view of the electrode boiler installation at the new all-electric swimming baths establishment which was recently opened at Watford. (ELEC. REV., May 12th, p. 669.)

**Belling & Co.**

A new pattern cooker will be on view for the first time. It is an all-enamel model with an oven 13 in. x 13 in. x 12 in. deep. The oven itself is free from all electrical parts, it being heated on what is said to be an entirely new principle. The hob is equipped with an improved boiler-griller plate, loaded to 2,000 W, and a 7.5-in. diameter boiling plate. The manner in which these boiling plates are plugged in is of special interest.

The "Belling Junior" is a new break-



**Santon, "Unity" (Barker, Young & Co.), and "Heatrae" (Elec. Fires, Ltd.) water heaters**

fast cooker, while a boiling ring with an oval-shaped top is another new product.

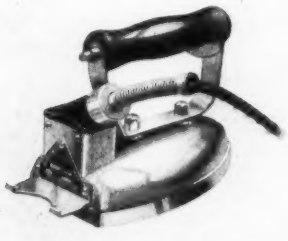
There will be a complete display of the company's present range of all-enamel cookers, which are being retained notwithstanding the new series, for many electricity supply authorities have standardised them for hiring purposes.

Samples of immersion heaters, fires, and radiators will also be exhibited.

**British National Electrics, Ltd.**

A new breakfast cooker, C 11 B model, is being shown for the first time. It has a total loading of 1,750 W and is capable of raising two pints of water from tap temperature to boiling point in 6 mins. 45 secs.; the same element grills with equal facility.

The construction of the larger cooker elements is such they cannot be damaged by fats, moisture, condensation, or creepage. An element may be



**A British National Electrics iron**

replaced in a few moments without the use of tools.

This company's iron (illus.) has a side-entry fixed cord-grip connector, which prevents tugs and strains being transmitted to the terminals.

A number of "Angus" floor and table standard lamps of various designs and finishes, together with "Floodlight" artificial coal fires and several radiators, are to be included in the display.

**Berry's Electric, Ltd.**

"Magi-Panel" built-in fires are the result of the experience of two firms, both specialists, one in electric fire design and the other in slate and marble (Slate Slab Products, Ltd). The 1-, 2-, and 3-kW. models are made in many attractive designs, plain and decorative, and finished to harmonise with practically any surroundings, including marble, wood, plain colours and clouded or grained effects in numerous shades.

The fixing of these panel heaters and the surrounds attached to them to the wall is quite simple; they can be made almost flush, thus economising space, and the slate back can be made in one piece without a cut-away so that it is safe to use it directly against a wooden partition.

The electrical equipment is rustless and heat control is provided. Certain models can be supplied with hearths, shelves, etc., of "Metlate." This is a deposit of pure metal, which is applied by a patented process, by which remarkable effects are obtainable. It can be made permanent by treatment and does not require polishing. Colour can be introduced by incorporating the "Magicoal" effect, and a synchronous electric clock can be built into the surround if desired.

Water heaters will also be shown.

**Geo. Bray & Co., Ltd.**

In addition to "Chromalox" high-speed boiling plates as fitted by many of the leading cooker manufacturers, there will be sample immersion heaters and a number of strip and ring heaters, together with a large number of drawings showing their varied applications for industrial heating.

The only new item will be an improved immersion heater terminal cover. The head of the heater, both automatic and non-automatic, will have a satin-finished aluminium cover with a subsidiary terminal block at the side of the heater, this being covered by a small piece of coloured "Bakelite." Ease of wiring and large-sized terminals are strong features of this new arrangement, while the fitting of this terminal block at the coolest position will considerably reduce the vulcanisation of v.i.r. cables attached thereto.

Lampholders and heating elements for such domestic appliances as wash boilers urns, kettles, percolators, flat-irons, waffle irons, etc., are to be included in the exhibit.

**British Electric Transformer Co., Ltd.**

This company's domestic appliances will be represented by a range of the well-known "Tricity" cookers.

**Bulpitt & Sons, Ltd.**

An addition to the already large range of electric kettles is the new 3½-pt. super table model. This 1,000-W kettle has a hammered copper body and is supplied in chromium finish only. It has been designed for use on the table while still retaining the high efficiency of the "Swan Brand" immersion element and the automatic safety device. Its list price is 45s.

A new copper-bodied coffee percolator, also finished in chromium plate, is to be publicly shown for the first time. A selection of "Swan Brand" fires includes a new 2-kW screen radiator, pewter hinged to heavy antique dog legs. This is an example of the new and improved mounting for the radiant fire bars. Its list price is 50s.

The display is completed by a full range of special ground-base utensils. They are made on a patent principle, and will remain entirely free from distortion, even under extreme heat, it is claimed. Jam and fish kettles, egg poachers, etc., are made with 0.25 in. ground bases that are guaranteed to stay flat.

**Burnley Components, Ltd.**

A special new line is a 10-gal. portable "Burco" wash boiler, fitted with a tinned copper pan. Also there is now a combined wash boiler and kitchen heater. A sliding door attached to one side of the container conceals the radiator, the elements of which are automatically switched on and off when the door is opened and closed.

A fire is thus provided for airing clothes or heating the kitchenette in which the boiler is used. The 1-kW radiator needs no extra wiring and it will keep the water in the pan hot after the boiling element has been switched off.

The boiler and fire can be used together or separately. The pan is provided with a lid, steam trap and a draw-off tap, electrical connection being made by means of a flexible lead to a switch plug on the wall.

**Carron Company**

Of the three standard cookers, the "Carronette," the smallest, for two to four persons, has been termed the "major at the minor price." Its oven is double-cased and efficiently lagged and it is fitted with a grill-boiler, the elements of which are protected against any liquid boiling over. A second boiling plate can be fitted if required, and there is also a useful hot-cupboard. The total loading, with the extra boiling plate, is 4,700 W.

The "A.1" and "A.2" cookers, which will supply the needs of four to six and six to eight persons respectively, are similar in design and construction. A novel and distinctive note is the flush front; apart from door handles and switches there are no projections. All the boiling plates and grills are of the plug-in type and each has a separate "earth" pin. An extra large hot-cupboard is fitted. The total loading of the "A.1" is 7,150 W, and of the "A.2" 7,900 W.

The "B.1" 2,000-W breakfast cooker is so designed that grilling and boiling can be done simultaneously. There is ample space on this boiler-grill, which has three-heat control, to accommodate two or three small saucepans. A white enamelled door plate converts the grilling chamber into a useful hot closet when required. The "B.2" has a boiling plate and separate grill, three-heat control being provided for each. The loading of the boiling plate is 2,000 W, and of the griller 1,500 W. A baby cooker is also to be displayed.

A few electric fires embrace the popular "Canterbury" and imitation coal fires, including a new light and cheap model—the "King Cole"—in 1- and 2-kW sizes. The new "Saturn" fire finds a place, while a 2-kW inset fire is to be shown complete with slabbed surround and hearth. Two lengths of tubular heater, finished in dark oak, are also to be displayed, with a selection of irons and kettles.

**Domestic Electrification, Ltd.**

This company has decided to concentrate on a smaller range of models of its "Dolphin" cookers, namely, the "Baby," suitable for two to four persons, medium size suitable for three to six persons, and the larger size for six to ten persons. Their standard finish is now mottled grey enamel. All the elements are of the plug-in type, complete with earth pin.

The company has taken over the sales for the South of England of the "Eziot" thermal storage water heaters, manufactured by Messrs. W. H. Smith & Co., of Leicester. Automatic models are available from 1½ to 100 gal., and non-automatic from 1½ to 15 gal.; also a type which will give instantaneously a small amout of hot water in addition to the usual bath. They can be finished in any colour cellulose, and either nickel or chromium plate. In addition to the usual cylindrical tanks there is also a corner type for awkward positions. A new design specially constructed for infrequent users incorporates the geyser principle, and gives ½ gal. of hot water for a hand basin in four minutes.

A further new development is the "hot steam duplicate hot water system," comprising a thermostatically-controlled electric system in conjunction with a coke-fired boiler. This can be supplied complete or existing cylinders can be converted.

The "Eziot" wash boiler will attract attention for hire or housing schemes. "Artic" fires, which are made in three types, combine radiant and convected heat, while at the same time a cheerful flicker is incorporated in the patent guards which cover the element. The latest model has also a coal fire effect.

Other items of interest are a small immersion heater and a small hand vibrator.

**Drake & Gorham Wholesale, Ltd.**

Automatic "Densacone" water heaters of several types are supplied, including barbers' outfits and an "under-the-basin" model that is specially suitable for bedrooms. The iron tanks are lagged with shredded cork and Bray's "Chromalox" immersion heaters are fitted as standard to all sizes.

The "Teesmade" apparatus, cabinet and tray models, is automatically controlled in combination with a clock so that it will make tea and other hot beverages at any predetermined time, giving an indication when the beverage is ready and, during darkness, switching on a lamp at the same time.

Metal-clad switchgear with round-tank circuit breakers will be shown. The standard ring-main unit is fitted with triple-pole oil-immersed quick-break wing isolator equipment on each side. These equipments are supplied for 300 A per phase at 11 kV and are coupled direct to the busbars, giving very convenient ring main switching. The switches are capable of breaking full-load currents and have "on," "off," and "earth" positions, fully interlocked to prevent incorrect operation, and also fitted with padlocking attachments. Access to testing points can be obtained, and efficient screening is provided inside the equipment.

There will also be a selection of public lighting fittings.

**Edison Swan Electric Co., Ltd.**

New boiling rings (illus.) of 8 and 11.25

**The Ediswan boiling plate**

in. diameter are of sturdy construction and reasonably priced.

The casing and legs are made of cast iron, finished in stove-black enamel with

a ground and polished cast-iron top-plate. The heating element consists of a nichrome resistance wire arranged in spiral formation in a slab of special refractory material, the leads within the casing being insulated by porcelain beads.

The 1,500-W single- and three-heat models are fitted with an 11½-in. diam. top-plate and have four legs to give

**Ferranti hairdressers' water heater with spray**

stability when using one or more utensils at the same time. They are also fitted with heat insulating feet; otherwise they are similar in construction to the 8-in. diam. model.

Two yards of flexible is securely clamped to a porcelain cleat affixed to the sole plate, thus eliminating the liability of overheating (cooking) of the flex. An earthing terminal is provided on the sole plate of all models.

The "Reflecto" boiling plate gives visibly radiant heat and rapid boiling times. Due to the reflecting plate over which the radiant elements are mounted, the heat is thrown up on to the bottom of the cooking utensil. This new plate is immune from the effects of spilt liquids, which cannot harm the special elements.

For boiling a small quantity of water a small pan can be heated by the centre portion only of the boiling plate. Various sizes are available to fit the leading makes of cookers.

The "Bandolero" fan is an entirely new deparature; in place of the rotating metal blades, three loop strips of silk ribbon are fixed 120 degrees apart round the circumference of a rotating cylinder. The strips are fixed at an angle with the fan axis, and are thrown out at the starting of the fan under the action of centrifugal force; consequently the air movement is exceptionally wide. It is possible to place the fan on a desk without disturbing papers.

The element of danger present in the case of metal-bladed fans is entirely absent. The motor housing and base are manufactured throughout from "Fabrolite," and the fan is completely insulated, electrically shockproof, and mechanically foolproof. It is finished in mahogany or walnut and it has a 40-W motor. The list price is 45s.

**Electric Fires, Ltd.**

This stand's centre piece consists of a 12-gal. F.B. cistern type water heater, with piping connections to three draw offs, cold water feed being direct from the main.

The corner pieces are examples of the "Heatrae" under-the-basin type water heaters; the horizontal form is operated by the ordinary standard basin valve, the hot water being discharged through a specially formed outlet bib fitted to the basin, and the other is particularly suitable for corner basins. These heaters will appear under actual working conditions.

A 16-gal. heater for floor mounting, with front entry heating elements, illustrates the application of a complete electric water heater that will work in conjunction with a coke-fired boiler or range boiler, while a 12-gal. displacement type heater is specially suitable for general domestic purposes. Flat 3 displacement type heaters are suitable for lavatory basins, and a 1½-gal. N.R.D. type is specially constructed for use at kitchen sinks.

A slot machine will be in operation, which delivers a pre-described quantity of hot water for a penny.

The H.S. heater, with mixing valves and hose spraying device for use in hairdressing saloons, has an auxiliary draw-off for shaving water.

Besides examples of "Heatrae" immersion heaters of the tubular type with removable core, flat-bladed types, and circulator patterns, there will be exhibited for the first time an auto-circulator.

**English Electric Co., Ltd.**

Some of this company's cookers on view will have a standard finish, mottled grey vitreous enamel, while others are semi-black.

One- and two-kW fires are to be displayed in selected finishes to suit all tastes, while water and tubular heaters are to be included, and possibly an electric washing machine also.

**Evershed & Vignoles, Ltd.**

Two new inventions of considerable importance are being shown for the first time.

One is an electrical indicator which has been specially designed for the measurement of the level of water in deep wells and bore holes. The Evershed automatic "plumb bob" system dispenses with the use of compressed air and float gear, is operated from the electric mains, and measures mechanically the level of the water below the engine room floor or other convenient datum. The system consists essentially of lowering into the well a small electrical element which automatically stops on reaching the water. The cable to which this element is attached is wound on a motor driven drum, controlled by the plumb bob at the water line. The motor raises the plumb bob as the water rises and pays out more cable as the level falls. An indicator and a recorder, mechanically operated from the winding drum, show the amount of cable paid out and therefore the level of the water.

The electrical element or plumb bob contains a resistance, the material of which has a high temperature coefficient. A current is continually passing through the resistance and varies in strength as the element is immersed in water or surrounded by air, and advantage is taken of this variation in the current to operate a relay and so control the motor driving the winding drum.

The second development is the "Noflote" system of automatic pump control without the use of any float gear, moving parts, or switches at the tank. The apparatus consists of two electrical elements containing resistances, which are fixed in the tank, the level of which is to be controlled, and a relay controlling the motor starting switchgear. The general principle is the same as that described above.

**Falk, Stadelmann & Co., Ltd.**

The range of this display will be wide. Among industrial cooking apparatus will be a number of new items described in our last issue (p. 777), including restaurant toasters, fish fryers, roasting ovens (illus.), and baking plates, as well as the "Efesca-Major" standard domestic cooker. All this equipment is made at the company's works at Rainhill, Liverpool.

A wide selection of domestic appli-

**An "Efesca" double-compartment roasting oven**

ances will comprise kettles, boiling plates, toasters, irons, curling-tongs heaters, "Bakelite" all-insulated hair dryers, immersion heaters, and urns.

The company also has an attractive range of fires, some of which are new designs for the 1933-34 season, in addition to the "Efesca" combined bowl fire, griller and boiler.

**Falkirk Iron Co., Ltd.**

The chief exhibit is a range of cookers, models 5239, 5379 (illus.), and 5380 (see last issue, p. 780), which feature a single

**Model 5379 "Falco" cooker**

fixed oven with a packing joint between the oven and the front to prevent the ingress of steam into the lagging. The enclosed elements of large area are provided with plug-in connectors and the hob is equipped with a boiler-griller, together with one or more Bray boiling plates according to model. The finish is best quality vitreous enamel inside and out.

Model 5350 cooker is provided with a removable oven and is popular with many supply authorities.

A new line of fires comprises up-to-date designs of cast-iron mantels fitted with heating elements, which should prove suitable for housing schemes. They are finished in attractively coloured enamels. There will also be "Falco" and "Trilite" glowing log-fires, breakfast cookers, and flat irons.

**Ferranti, Ltd.**

Besides synchronous clocks and radio receivers, both a.c. mains driven, the

**The Ferranti 2½-kW "Glowera" fire**

company introduces a complete range of fires for the forthcoming season. The "Glowera" (illus.), which combines radiation efficiency with cheerfulness of appearance, is to be made in two sizes of 2 and 2.5 kW, each with two-heat control. A further extension of the range is the 750-W "Minera," which is priced at 25s., and a new 1,500-W model that is provided with two-heat control. Interesting examples of more costly fires are to be exhibited with solid bronze castings in a variety of different finishes.

In the water-heater section there are

to be introduced three new types, namely, a 3-gal. rectangular displacement type, a 12-gal. cylindrical cistern, and a 15-gal. rectangular cistern heater, all of which have vertical elements and are arranged to be mounted on the wall. There is also a 1.5-gal. barber's water heater (illus.), complete with special mixing valve, hose, and spray, listed at £8, as well as a model specially arranged for direct connection to a coal-fired boiler.

An entirely new product this season is an immersion heater and circulator. A new design of flexible element is incorporated, and these appliances, which are to be available with loadings of from 1 to 3 kW, have several other novel features.

**General Electric Co., Ltd.**

The opportunity will be taken to introduce the new "Magnet 333" electric cooker, which is somewhat smaller than the present "432" and consequently cheaper. On the same section of the stand will be "732" cookers, together with the thermal storage cooker.

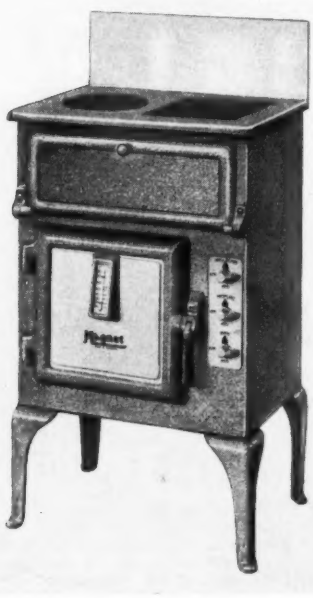
The restricted space available in many small houses is the immediate cause of the introduction of the "DC.333" model. Although the overall dimensions are restricted, the hot cupboard is of maximum width, and a very generous-sized hob equipment has been incorporated. It is priced at £11 10s. in "de luxe" finish, complete with thermometer and splashguard.

The overall dimensions (with splashguard) are 20¾ in. by 19 in. by 41 in. high, and the oven measures 11½ in. by 13⅜ in. by 11¾ in. The oven loading is 2,250 W, there is an 1,800-W boiling plate and a grill and combined hotplate of similar loading. The oven is provided with two grid shelves and a pan.

With regard to the heat storage cooker, in one area alone no fewer than seventy models are installed and are giving every satisfaction. Some very interesting figures are to be given in connection with the effect of heat storage cookers on the supply company's load.

Water heaters will be prominent; the 1½- and 12-gal. sizes will be found to serve the majority of requirements of supply engineers. Among other appliances will be the new "Magnet" cleaner recently put on the market, and a range of kettles, toasters, irons, fires, etc.

On a separate section of the stand will be a number of street lighting units,



**The new "Magnet 333" cooker**

among them the "Wembley" lantern and the new "Osira" lamp as installed along the Watford Road. A display of "Osram" lamps completes this section.

Throughout the period of the Conference "Osira" lamps will be installed in the lamp posts on each side of the north entrance to the Pavilion, while a similar lamp, with an all-round dispersive fitting, will be fixed in the Pleasure Gardens. In addition, "Osira" floodlighting lamps and fittings will be used for floodlighting the western side of the Pavilion.

**Geo. Green & Co.**

A representative heating display will include wash boilers, hot plates, towel rails, immersion elements, water heaters, and hot-water radiators.

**Green, Phillips & Co.**

Typical models will represent the company's system of heating by means of convectors, which are designated "P.H."

**Hague & McKenzie, Ltd.**

Specially constructed utensils for use on electric cookers are featured. "Pyramid" aluminium ware is well known. Pots and pans are made with thick bottoms so as to minimise distortion and improve the "all-over" heat contact with hot plates, thus speeding up the boiling time. The 0.25-in. bottoms are ground to produce even thickness and a dead flat surface, while the patent reinforced "Bakelite" handles fitted to these utensils are fully insulated and heat-resisting. All sizes and shapes are available, including square pans and triple saucepans made to fit an 8-in. circular hotplate; also kettles, steamers, &c.

**L. G. Hawkins & Co., Ltd.**

Adjustable and standard table lamps, "Tricity" fires and radiators, "Supreme" hair dryers, a sewing machine motor and foot-pedal regulator, a "Universal" food and beverage mixer and beater, and a varied selection of lighting fittings and "Silken" illuminating glassware form this exhibit.

The new "Supreme" suction cleaner is unusual. This inexpensive machine is specially shaped for "one-hand" use, it being exceptionally light in weight and well balanced. The dust receptacle is totally enclosed in the metal casing.

There are also a new "Supreme" kettle and wash boiler, the latter galvanised or with a mottled blue exterior. It stands on three legs, has two lifting handles, a draw-off tap, and an automatic washing device. Two shrouded switches provide full, medium, and low heat, ball-type dollies being used through which water cannot splash. The pan is made of heavy-gauge material and is electrically welded throughout, no solder entering into its construction.

The elements and switches are enclosed in a seamless compartment in the bottom. The elements are copper sheathed and they are made easily replaceable by a special clamping device which does not pierce the bottom of the pan, thus leaving the interior free from screw or rivet heads and preventing water leakage.

The 6-gal. size, which is priced at 27s. 6d. (ex works, Birmingham), is rated at 2 kW, the 8-gal. size at 2 and 3 kW, and the 10-gal. model at 3 kW.

**Horstmann Gear Co., Ltd.**

A full range of electric time switches for operating street lamps, controlling shop-window lighting, and two-rate meter work, etc., are obtainable with 15-day, 40/42-day hand-wound or electrically-wound clock movements, or synchronous motor time switches.

The latest pattern of "Newbridge" solar compensating dial is of considerable interest. The company also makes the "Rotaheat" portable electric fire, a cord adjuster, and a dimming switch.

**Hotpoint Electric Appliance Co., Ltd.**

This company's "Utility" and "De Luxe" cookers are manufactured for it by the B.T.-H. Co. at Rugby. The "De Luxe" type is fitted with "Torribar" boiling plates and oven elements, in addition to which there is a combined grill and simmering plate. They are attractively finished in grey mottled vitreous enamel.

The Model 196 "Junior" vacuum cleaner, recently put on the market, embodying beating-sweeping and air cleaning actions, is now fitted with a rubber bumper to prevent damage to furniture. The side wheels have been moved to the back of the nozzle, and the size of this is increased. Further, the rear castor is now of the swivel type, which makes for ease in operation. The "Duplex" cleaner is a larger and more powerful appliance.

The "Gem" and No. 216E62 bowl fires can be supplied in a number of attractive finishes.

The "De Luxe" iron, which has now included as part of its standard equipment a flex support (illus.), is worthy of note. Polished copper and nickel-plated super-automatic electric kettles, the prices of which were very considerably reduced a short time ago, will also be on view.

The "Hotpoint-B.T.-H." immersion heater can be fitted in an existing tank very easily, the equipment consisting of

**The Hotpoint iron flex support in use**

heater, 3-way flange, thermostat, and drain cock.

Another very useful appliance is the BH.154 self-contained boiling plate, fitted with a "Torribar" heating unit. It is possible to place three average-size utensils on it at one time. The loading is 1,850 W, and three-heat control is arranged. The finish is in grey mottled vitreous enamel.

"Hotpoint-B.T.-H." washing machines have a maximum tub capacity of 14 gal., but the floor space occupied is only 25 in. square. An ironing attachment is available for use in conjunction with this machine. The price, with ironing attachment, is £45.

**Jackson Electric Stove Co., Ltd.**

This company's cooking demonstration coach, which has recently been put into service to assist electricity supply undertakings, will be in Bournemouth during the Convention.

Model 91J cooker, for three to five people, is claimed to have the largest sale of any electric cooker in this country. Models 94J (for five to seven persons) and 95J (for seven to ten people) have been produced on similar lines. They have plug-in type elements, all of which, together with the hob understructure carrying the boiling plates and grill-boiler, are immediately removable without the use of tools.

The company has continued its policy of avoiding change in external appearance so as to reduce obsolescence. The cookers being shown are designed for hiring schemes and ensure minimum maintenance cost.

A special feature of this exhibit will be the showing for the first time of two cookers in coloured vitreous enamel—one in dark blue, with light blue panels and legs, and the other in green with cream panels and legs. These cookers lend themselves admirably to matching colour schemes in modern kitchens.

The "Utility" heater, which has been recently introduced, combines a room heater with a breakfast cooker, capable of grilling, toasting, frying and boiling. This is an admirable heater for use in bachelor flats and small apartments.

There are some new designs of fires, inset pattern, for building in to fireplaces, in addition to thermal storage electric water heaters and an electric wash boiler, which is fitted with "Chromalox" heating elements.

**Johnson & Phillips, Ltd.**

The "Charlton" electric storage water heater described in our last issue (p. 780) will form the main exhibit. It will be working, and supply engineers will be invited to examine it in the closest detail. An item of special interest will be the "Charlton" water heater without its outer casing. The careful arrangement of all water pipes will be instantly apparent, and the company's claim for ease and cheapness of installation will be demonstrated. From 2- to 30-gal. heaters are available for hiring schemes. The company also makes low-temperature tube and panel heaters.

Another J. & P. innovation of definite interest is their street lighting relay switches. A demonstration panel, incorporating three units, will be working on the stand, these being designed for push-button or similar control of group lighting throughout a specific area from a central control point.

**Archibald Low & Sons, Ltd.**

A new immersion heater being shown for the first time is the "Looprod," which is being manufactured to take the place of the bladed type. It consists of a chromium wire element in the form of a coil firmly embedded in crystalline magnesium oxide and enclosed in a solid-drawn copper tube, which is heavily tinned.

Elements of this type are embodied in the side-entry circulator, making it much more compact and lighter in construction than the earlier patterns. This circulator can be fitted to any tank without soldering and has the special feature that the heating element is near the bottom of the tank. A small supply of hot water is available in a few minutes, and when the tank is heated up there is a difference

The "Looprod" immersion heater

of temperature between the top and the bottom.

Other items will be tubular heaters, removable-element immersion heaters, top entry and external type circulators, 18-kW circulators for central heating installations, radiators, water boilers, coffee urns and towel rails.

Tanks from 1.5 to 30 gal. include open outlet, ball valve cistern, and pressure types. There is a hot and cold water mixing valve with a hand spray for fixing to small tanks for barbers' use, and a new rectangular ball valve tank with a special outlet connection arranged so that the hot water is always drawn off from the top, and the rate of supply through the outlet is independent of the rate of the cold water inlet supply.

**Manor Electric Oven & Fire Co.**

Improved cookers, suitable for two to three and four to six persons respectively, are of the table-top type. No. 1,266 is fitted with a hob having 3 in. greater depth than formerly, thus permitting two 7-in. saucepans to be used on the plate at one time. No. 1,267 is now fitted with an oven having 2 in. greater height internally and also a larger hob, permitting four 7-in. saucepans to be used at one time.

A new small hot cupboard (illus.), 45 in. long by 24 in. high by 11 in. deep inside, has exterior walls made of black mild steel, mounted on 1¼-in. angle iron frame with interior walls of galvanised steel.

The new "Manor" hot-cupboard

Lagged throughout with 1½-in. slag wool, the cupboard is fitted with two sliding doors and five perforated shelves, and it is heated by four tubular standard "Manor" elements controlled by one three-heat switch and fuse fitted at one end of the cupboard. The loading is 1,200 W, and the external finish stove black enamel.

Immersion heaters are constructed of special double-section tinned copper tube brazed into an end plate with spun brass cover and complete with a withdrawable-type element, inside tank brass flange, metal grummet joint, and fixing screws. The element can be removed without breaking the water joint. The list prices are: 1 kW, £1 1s.; 2 kW, £1 10s.; 3 kW, £2; 4 kW, £2.

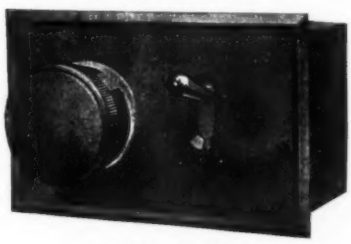
A small cooker, 21 in. wide by 14 in. deep by 16 in. high, will be obtainable in either standard stove black enamel or all-enamelled de luxe finish. The hob is fitted with a 1,700-W new cast-iron grill-boiling plate, and the oven is fitted with a flat element at the bottom, constructed with similar steatite formers as used in the hotplate, with a loading of 800 W, making a total maximum load for the cooker of 2.5 kW. Control is by two three-heat switches fitted on a panel at the side, on which is also mounted a plug for an electric kettle.

A new 3½-pt. automatic kettle loaded at 1,000 W will also be exhibited.

In addition, it is hoped to display a new roaster, a double bain-marie cooker, and a range of electric fires.

**"M.K." Electric, Ltd.**

An essential feature of the new range of cooker control boards is that live metal is made untouchable by the employment of screens over the socket tubes, which completely shroud them when the plug is not in position. It is felt that with earthed metal adjacent to the socket this safety feature far outweighs the small extra cost. The fuse base, too, has been designed on particularly safe lines, and the sockets are so



An M.K. switch plug

deeply recessed that it is impossible to touch them.

The secondary outlet is three-pin, 5-A or 15-A, and the larger is often used for plugging in wash boilers. The switch controlling the secondary circuit is of a new double-pole quick make and break type, and the dolly is "Bakelite" heavily reinforced, and will not break off.

An interesting feature is the "change-over" type of main switch, which can be embodied in all "MK" control boards. Another type of board has two fuses and a secondary circuit, consisting of the new 15-A interlocking switch-plug, which takes an ordinary B.S.I. plug. The third pin is not cut or grooved in any way, and any make of B.S.I. three-pin plug can be used.

All the front plates are nickel plated on cadmium, satin finish. The iron boxes are stove enamelled mottled grey as standard.

For assisted wiring schemes there are many attractive accessories. "Anti-Flash" screened sockets and plugs in all B.S.I. gauges are to be seen, in addition to safety fuse adaptors, which give 5-A and 15-A outlets with cartridge-type fuses from one 15-A power point.

**Moffats, Ltd.**

Besides storage-type water heaters, the hermetically sealed refrigerator is new, being of the rotary pattern, practically silent, and free from vibration.

Some of the 1933 "made in England" cookers are finished in colours. A special demonstration cut-away model will show the construction of the cooker in detail. Recent improvements are the incorporation of a "Cookquik" boiling plate, and the addition of a new "Therm-o-matric" oven heat regulator, which is the company's answer to the "Regulo" oven temperature controlling device fitted to gas cookers.

**Radiovisor Parent, Ltd.**

Units for the control of public, factory, and advertisement lighting include the latest Mark V and VI types a.c. and

The Moffat type E.37-M cooker

Mark V d.c., which is being shown for the first time.

Other exhibits on view for the first time will include an industrial smoke indicator, such as has been installed in important power stations, a turbidity indicator, and the "Radiovisor" counting unit, which is extensively used in bakeries, etc.

Visitors will renew acquaintance with the invisible ray burglar alarm, and the company's efforts to interest the experimenter and the amateur are indicated by the presence of an extensive display of "Raycraft" apparatus.

**Revo Electric Co., Ltd.**

A range of cookers is shown to suit all sizes of family. The hot-cupboard extends almost the full width of the cooker, and there are no projections. The method of carrying the boiling plates is worthy of inspection: single crossbar supports each of them in conjunction with the sockets, which are arranged in the side frames together with the fuses. The removal of the boiling plates and crossbar

The "Econowash" boiler

makes the hot-cupboard entirely clear.

Prominence will be given to the "Superspeed" boiling plate demonstrations. Special utensils are not needed and maintenance cost is very small.

"Revocole" artificial coal flicker fires will be shown, together with wash boilers, perhaps something new in water heaters and circulators, and a selection of the company's street lighting units.

A recent introduction by the Revo Company is the "Econowash" wash boiler which we illustrate above.

**A. Reyrolle & Co., Ltd.**

An all-insulated house-service fuse box comprises three distinct parts, namely, a cable sealing box, a self-aligning fuse, and a separately enclosed neutral link.

All the insulating and enclosing parts are made of moulded insulation.

The "Reybowl" is a neat chromium-plated ceiling radiator controlled by a cord switch on the ceiling. It is particularly suitable for bathrooms, the price being 30s., including ceiling rose, tumbler switch, and block. The suspension chains can be adjusted to direct the heat rays in any desired direction.

The "Reymez" electric pedestal wash-basin, hot-water storage cylinders, metal-clad immersion heaters with facilities for earthing, and the "Eureka" vacuum cleaner are well-known domestic appliances.

For temporary lighting and similar connections multiple plug couplers are made of two types, in straight and circular patterns, both consisting essentially of 5- and 15-A British Standard plugs and sockets. Among the outstanding features of these couplers are their extremely light, yet strong weatherproof construction, their flexibility in use, and their adequate earthing facilities.

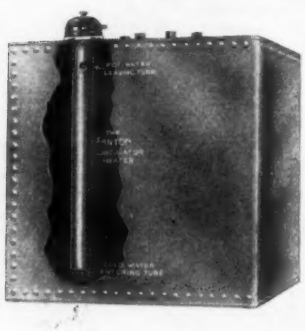
**Santon, Ltd.**

Thermal storage water-heaters for domestic use and public institutions are listed in sizes of from 1.5 to 100 gal. capacity, the N.P.T. model being the non-pressure type, P.T. pressure type, D.F. cistern, and F.M. for floor mounting. They have tinned copper water containers and brazed seams throughout, are controlled by an adjustable thermostat suitable for a.c. and d.c., and highly finished in every detail with all-British material.

The "York" storage heater, offering quick service to a number of points, with its own water control incorporated, has its peculiar advantages in many cases where instant service is not an essential feature.

Circulators and "Circ-Stats," the former hand controlled and the latter thermostatically controlled, for the conversion of existing domestic hot-water storage cisterns, provide economical general hot-water service throughout the house.

The latest "Santon" product, which will be demonstrated for the first time,



**The Santon circulator heater**

is compact, simple in operation, and very easy to install, particularly in modern bathrooms, provides a shower of four minutes' duration at a predetermined temperature for the small consumption of 0.5 kWh, with a recuperation period of eight minutes. After four minutes' shower the water gradually cools off.

A geyser of the instantaneous heating type is already extensively in use.

The Santon wash boiler is highly finished in an "indestructible" enamel, cream or mottled grey to harmonise with modern practice in cookers and refrigerators, the spout and fittings being chromium plated, and the rim of cast and polished aluminium. The three-heat switch incorporated in the casing of the boiler renders it portable for storing when not in actual use.

A full range of multi-way plugs of two- and three-pin types, as well as control units and switches, will also appear.

**Siemens Electric Lamps & Supplies, Ltd.**

An entirely new range of "Xcel" cookers (illus.) embody plug-in elements throughout. A large grill-boiler is fitted to all models, and the hot chamber extends the whole width of the cooker. Switches are fitted to the front frame, and provision is made for a switch-plug, pilot light, and double-pole main switch to be fitted if required.

Storage tanks, with copper water containers and non-ferrous metal where there is contact with water, will appeal to

**One of the latest "Xcel" cookers**

the engineer developing a water-heating load. The new "Xcel" flange is an ingenious device enabling a complete water-heating unit (immersion heater, thermostat, and drain cock) to be quickly fitted in one operation. All the company's immersion heaters, by the way, including the blade type, have easily renewable elements, so that in the event of failure a new element may be fitted without emptying the tank. Most blade types need complete renewal of the blade. The new tube heater has a multi-connector for the simplification of wiring up banks of tubes.

There will be several interesting new fires, including "Cosyglo" models.

Two interesting developments in Siemens lamps are the "Dobrulux" and the "Neonic." The former is specially adaptable for electric signs, giving a gyratory flicker effect which compels attention, the consumption per lamp being only half a watt. The "Neonic" is an interesting tubular lamp containing any number of letters up to ten, these standing out with remarkable effect. One or more of these lamps may be built up into suitable signs for advertising purposes, and a range of very attractive signs is available. These lamps have been developed in the Siemens laboratories out of the research which is being carried out generally on gaseous discharge lamps.

A clock dial and a cyclometer counter single-phase integrating house-service meter, together with a show case containing all the parts of a Siemens meter, will also be on view.

Cooker control switches and lighting switches and switch-fuses, the latter incorporating Siemens high rupturing capacity "Zed" safety cartridge fuses, will complete the exhibit.

**Simplex Electric Co., Ltd.**

Water-heating appliances include both automatic storage and immersion heater types. The company's latest "Creda" cooker models will demonstrate recent developments in boiling rings, while a new product is a wash boiler.

"Vulcan" tubular heaters with interesting illustrations of their applications are to be represented as well as "Credalux" street lighting equipment and samples of the latest patterns of lanterns, reflectors, and other fittings.

**J. H. Tucker & Co., Ltd.**

Two quite new control units incorporate an indicating pilot lamp in a 3-pin socket controlled by a q.m. and b. tumbler switch. The 5-A pattern has been accepted as a convenient accessory for use with irons in laundries, and the 15-A pattern is suitable for controlling tubular heaters in theatres and halls where in the darkened auditorium one cannot be certain whether the elements are "on" or "off."

The "Ultraneat" cooker control unit was introduced last February. It provides a central straight-through unobstructed passage for main and cooker cables, with the provision of a convenient sub-circuit for kettles, irons, or other appliances. The main circuit is controlled by a double-pole q.m. and b. 30-A switch and the subsidiary circuit by a 5-A double pole tumbler switch, both protected by a new design S.P. "plug-in" type fuse with indicating pilot lamp. The main switch is operated by a semi-rotary wing type handle, smooth in operation and having a minimum projection. No projecting lugs mar the external appearance, and the unit is extremely light.

Another development is a heating control unit consisting of a three-pin switch-socket controlled by a q.m. and b. tumbler switch with an indicating pilot lamp. It is made in two sizes, one (5-A) for use with laundry irons and the other (15-A) for controlling tubular heating installations, especially in theatres, music halls and similar places.

"Stelac" 5-A pressed-steel fuseboards are available in 2, 3, 4, 5 and 6 fuse ways, and embody the above-mentioned new pattern "plug-in" type fuse. No cast iron or wood is used, the all-steel construction being about one-third the weight of corresponding cast-iron units.

Simplicity of the cord grip and the easy access to terminals for wiring purposes are the outstanding features of the new pattern plug design. The disc portion carrying the one-piece combined pins and terminals is secured to the cover by one captive screw of substantial diameter, centrally fitted in the plug. By merely tightening this central fixing screw the outer covering of flex is automatically and effectively gripped between disc and cover. The cover provides four alternative entries for varying sizes of twisted, circular braided, or c.t.s. type flex. Small sizes are gripped at small entries, and easily removable "knock-outs" provide two larger entries for flex up to 16/012 gauge.

A special exhibit is being made of a new rust-proofing process applied to iron castings, showing the results of varying periods of exposure similar to actual conditions experienced in installations.

**Venner Time Switches, Ltd.**

Besides master frequency control clocks there is a new range of a.c. pre-payment meters for dealing with two-part

**The Venner time-switch meter**

tariffs of various types; a range of time switches suitable for off-peak control; and a new combined time switch and meter suitable for controlling supply during off-peak hours and registering kWh consumed.

Interesting working demonstrations will be given of the Venner synchronous motor, which runs at a speed of 200 r.p.m., and is claimed to be the only self-starting synchronous motor which does not operate on the shaded-pole principle. It was described in our issue of May 19th (page 764).

The range of standard time switches completing this exhibit will this year be further augmented by several new types for special purposes, together with relays, stop-watches, &c.

# Correspondence

*Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession*

## Grit in the Human Machine

A matter of great importance to the human element in the electrical industry—particularly the supply branch—and perhaps of chief interest to the younger men, has been touched upon in letters which have appeared in your paper from time to time. I refer to the view we have had of the aggressive young man of ability, unable to make any progress in his career, and blaming the older man, his superior, for the latter's unconcern, or for his unjust dealing.

In these days of economic distress, extreme specialisation and so-called rationalisation in industry, the young engineer whose only asset is ability is in an unenviable position compared with even the men of the pre-war generation. The philosophy of Samuel Smiles is less useful nowadays than the philosophy of Karl Marx. We can ignore the inventive engineer of genius, who is a man specially gifted, belonging to a coterie too small to affect the situation. Unlike the other professions, most of which serve the public directly, and in which, therefore, real ability can seldom escape recognition, the engineer serves in most cases as a mere executive, whose whole career is placed in the hands of the man who is above him.

This is a sorry state of affairs, but is less unbearable when the chief is master of his job. He will then be most likely to realise the merit of anyone under him. It is generally the incompetent, or the barely competent senior who is oblivious to worth in a junior, and who will be swayed by considerations often very far apart from the mere ability of those under him. In sum, the efficiency of any staff is a function of the efficiency of its chief.

Nothing tends to mar the efficiency of a junior more, or more embitters him, than to be passed over unjustly. The senior is responsible; if he must pass a man over, let him give him a reason, and do not let us have so much of this "tactful" dealing—the word "tact" is too often a mere euphemism. Also, the senior is permitted his own self-satisfaction, but never let him exhibit it before his junior. We may often grant him the possession of brains, but we realise that he certainly had a share of good luck, without which, all the ability in the world can count for little or nothing.

If of any interest, I may say I am in the early thirties, in neither a senior nor very junior position. I have never been promoted in a firm, never been dismissed, but often been commended. I reached my present position by following a policy of "get on or get out." I have been in this post for several years now, hoping. Alas, it is time to "get out" again! A.M.I.E.E., A.M.I.Mech.E.

Calcutta, *May 18th.*

## A Plaint from the West Country

A year or so ago I retired from active electrical work in an industrial district after a very busy career and came to live down in the west country. Compared to my former experiences I am now finding life quite a drowsy affair and am catching something of the local disease—dilatoriness. I cannot, however, keep my finger out of the electrical pie and am tempted to express a few thoughts on matters as I see them from my present detached point of view.

I observe that the Western section of the grid is getting toward completion—when is the whole thing going to earn 2½ per cent. on its cost? You, Mr. Editor, will know much more than I do, of course, about these matters, but I do hope it will be a financial success, although I hear that prospects are rather thin in the West! I have spent some little time studying the electrification of farms, but I see little hope about here. Power requirements are small and can be met quite cheaply by a small petrol engine.

I heard the other day of a small town supply whose total annual expenditure (station) was £6,000 and which received a quotation from the grid folk—whoever they may be!—at just under £9,000. I should have expected it would have been the other way round; I have since heard that the grid will supply in the summer the town carrying the load in the winter. All this at "unit" cost only—no m.d. charge. To me this sort of thing is disappointing.

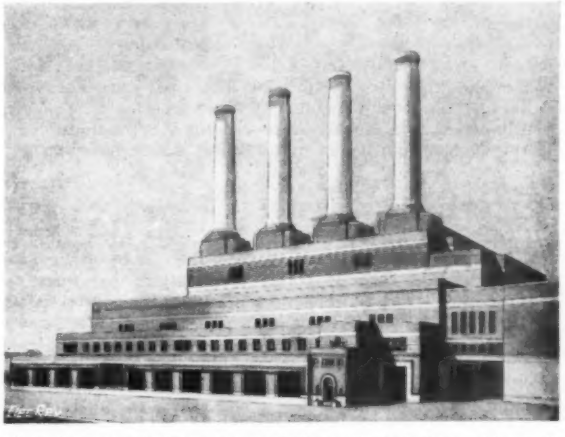
I think that eventually, in order to load up the grid to its economic value, houses will be wired and a supply given on the lines of the usual water service—£5 a year and use what you like, but purchase your own consuming devices! Plenty of difficulties will arise, but they must be overcome as soon as possible!

Here am I down in a country village. Electric light is in the house and yet only yesterday I agreed with the local gas company, which has just come into this area, to put us in a cooker! (I hear you say "Shame!" and so say I!) It cuts me to the heart to have to tell this true tale, but I was powerless in the face of the finance of the matter and the desire of the "Home Ruler"—who had always had an electric cooker—to try out the gas article. But in my retirement finance is the real high spot and against this I cannot fight! Here I weep! A CANDID FRIEND.

*May 31st.*

## What is a Consultant?

Mr. Elvey's letter in your issue of May 19th draws attention to a very undesirable practice, which unfortunately is only too common, and certainly calls for action on the part of the governing bodies in the engineering world. Unfortunately, as will be seen from his letter, some of the largest electrical engineering firms are the chief offenders, their "tame consulting engineer" preparing specifications to which his secret partners will in due course tender and—in most cases—get the work.



**What the new Fulham power station will look like. (See note on page 830)**

Unfortunately, too, some architects take advantage of the facilities afforded, obtain tenders from such firms and insert in the bill of quantities for their builders a p.c. sum for electric lighting or power, and when the building contract is placed give the order for the engineering work to the firm which furnished the estimate, without giving the client the advantage of obtaining competitive tenders for the engineering portion of the building contract.

The contractor or manufacturer expects—and rightly expects—to get "a square deal" from the independent engineer, and if he has any complaint to make about the professional conduct of any member of the Association of Consulting Engineers he has only to place the facts before the Committee for the matter to be investigated. Is it too much to ask that the same "square deal" should be given by manufacturers and contractors to the members of the consulting branch of engineering?

I think that the technical Press could help very greatly if they would confine the use of the term "consulting engineer" to bona fide independent engineers, and impress on contractors—and also public officials—that it is not cricket to claim for themselves a title which, under the definition approved by the Board of Trade in the articles of association of the Association of Consulting Engineers, should be confined to independent engineers having their own office and staff, and not directly or indirectly concerned or interested in commercial or manufacturing interests such as would tend to influence their exercise of independent professional judgment in the matters upon which they advise.

A. H. DYKES, *Joint Honorary Secretary,*
Association of Consulting Engineers.

London, S.W.1, *June 6th.*

## Domestic Water Heating

I was particularly interested in the article by Mr. Jervis on this subject, and in Mr. Dunn's letter in your issue of June 2nd.

Mr. Dunn does not agree with the author's method of piping, but I must mention that I have a similar arrangement and there has not been the slightest difficulty and certainly no signs of heating in the cold tank. Moreover, I dis-

agree with Mr. Dunn's wiring in the same manner as he criticises the author's piping. Can he explain how the top heater can be put into use alone while the wiring to the pilot lamp is carried out in accordance with the diagram accompanying his letter? Does not the lower heater become fed through the pilot wires looped through the lampholder?

Mr. Dunn remarks that it is surprising how little time is required to heat up the top element; his surprise is understandable if both elements are in action when he is of the opinion that only the top one is in use. I do not agree entirely with control by a three-heat switch instead of a thermostat switch. True the latter is a little expensive at first, but there is definitely a saving in current. However, the matter of control is not very important and is governed by demand.

Redhill, *June 6th.* H. O. COLLETT, A.M.I.H.V.E.

### Electric Milk Sterilisation

On page 552 of your issue of April 21st you have an article on "Electricity in the Milk Industry," and it is very gratifying to find Great Britain so far ahead as to have such a well-equipped dairy. 1,600 gallons of milk per hour, however, is a figure which we in Africa could not hope to realise, as we have not many more white people in the whole of South Africa than there are in Bradford.

The purpose of this letter is to let you know, however, that we are not very backward here, and we enclose an article from the *Cape Times* of April 11th, 1933, describing a plant comprising a large electric storage water heater and an electric steam generator. We believe that this is the first electrically operated steriliser for such a purpose in South Africa. In the article describing the Bradford installation they apparently do not sterilise bottles and cans, evidently being satisfied with a spraying of hot caustic solution, cold water, and hot-air drying. We would be very glad to have an expression of opinion as to the merits of the two processes from a purely theoretical standpoint.

We are quite satisfied that the sterilising process is the right one for this country, because with our native labour we could never be sure of their having got rid of the caustic soda.

ALBERT VAUX & Co.

Capetown, *May 19th.*

### Progress and Low Charges at Wimbledon

In view of the growing appreciation of the value of the water heating load to electricity supply authorities, I think the following statement showing the progress at Wimbledon compared with previous years will be of interest and encouragement to your readers:—

*New water heaters installed January to May inclusive.*

| 1930. | 1931. | 1932. | 1933. |
|---|---|---|---|
| 84 | 121 | 199 | 562 |

We now have 2,828 water heaters on circuit.

The Town Council of Wimbledon at a meeting held on May 31st adopted the following optional tariff for all domestic consumers:—

(a) A fixed charge to be made based upon the size and type of house and payable by equal quarterly instalments,

(b) a charge for all energy consumed for domestic purposes of three units a 1d. in the two summer quarters, and two units a 1d. in the two winter quarters, as from the dates of the meter readings, and

(c) no meter rental charge to be made.

A. E. MCKENZIE, *Chief Engineer and Manager.*

Wimbledon, *June 3rd.*

# The Chicago Fair

THE Century of Progress Exposition, which has been opened in Chicago forty years after the renowned World's Fair, is, in effect, a tribute to the progress made possible by the use of electricity. The Hall of Science contains models of basic experiments, and its electrical interest is mainly historical. The Electrical Building houses examples of the application of electricity to modern conditions, and is more practical in its appeal. The visitor to the Electrical Building first comes to the telephone and telegraph exhibit, which, the *Electrical World* states, is in an amphitheatre, the walls of which are lined with all the related developments of sound and electricity and also of sight and electricity.

The four supply undertakings serving Chicago exhibit a striking illuminated map, a novel combination of visual and audible methods drawing attention to the main features of their systems. The section called "Electricity at Work," the exhibit of the supply companies of the U.S.A., covers 8,000 ft. of the mezzanine floor. Its six divisions show the uses of electricity in the home, on the farm, in commerce, in schools, in hospitals and institutions, and in industry. Most of these displays consist of full-sized installations. Thus soil-heating and irradiation are presented, in collaboration with Purdue University, in a large greenhouse. Electricity as a business accelerator and a profit maker (particularly in the form of light) is emphasised in the commercial exhibits.

Among the industrial applications, special attention is given to electric furnaces for melting, heat treating, and annealing metals and to welding of huge steel sections. The uses of electric motors are taken as a matter of course, and are not much in evidence, but control by photo and other electronic devices is a feature. The most spectacular exhibit is the 90-ft. long diorama, said to be the largest ever made, depicting the generation, transmission, distribution and utilisation of electricity under conditions of light and darkness.

### Popular Spectacular Displays

The manufacturers in the great hall demonstrate some of the more spectacular apparatus in operation. The chief attraction is the research display of the General Electric & Westinghouse Companies, which shows, in the form of a continuous programme in a theatre holding 200 people, applications of photo-electric cells, h.f. coils, cathode-ray oscillographs, ultra-violet rays, thyratrons, &c. The concealed lighting of the theatre is by both filament and discharge lamps using neon, mercury, and sodium gases.

The Westinghouse exhibit includes a striking demonstration of short-wave transmission and also of a magnetic strain gauge, which is probably the most sensitive device known for measuring small deflections, even to one-millionth of an inch. Models of electric tractors, voice-controlled railways, and a mercury-vapour plant are other notable exhibits of different firms. There are also displayed many outdoor lighting fittings for producing novel and striking effects. The exterior illumination of the Exposition is summarised as decorative flood-lighting in static white light, which has been chosen in view of the brilliant hues of the buildings and also on account of the expense of introducing mobile colour on so large a scale.

At least 3,000 kW of the lighting equipment has been installed by the authorities in addition to that provided by the exhibitors. The total figure includes more than 15,000 filament lamps ranging from 10 to 3,000 W, twenty-four 36-in. arc searchlights, seventy-two 24-in. incandescent searchlights, and thousands of feet of neon and mercury-vapour lamps.

Electricity is purchased from the Commonwealth Edison Co. The greater part of the Exposition is served from a 30,000-kVA sub-station fed by six 12-kV lines. From this point are taken nine 4-kV underground feeders to the transformer vaults in the fair buildings. A tenth 4-kV feeder supplying a separate section comes direct from one of the Edison Co.'s sub-stations. The transformer capacity in the forty-one vaults aggregates 25,000 kVA, ranging from 75 to 2,850 kVA (Hall of Science), and 2,100 kVA (Electrical Group). All buildings are provided with emergency lighting circuits.

### The Aluminium Industry in Scotland

THE production of aluminium is divided into five sections: mining, alumina manufacture, carbon electrode works, aluminium reduction works, and rolling mills; and the reasons determining the situation of factories are set forth. The aluminium industry in Scotland includes the manufacture of alumina and carbon electrodes, and the electrolytic production of the metal. The latter is absolutely dependent on cheap regular supplies of electrical power as approximately 26,000 kWh is required for the manufacture of one ton of aluminium from alumina. In a paper by Mr. G. Boex, read at a meeting of the Institution of Mechanical Engineers at Edinburgh, on May 30th, the Burntisland alumina works of the British Aluminium Co. are described. The process is a chemical one: the ore is ground and mixed in caustic soda liquor and digested under pressure and heat. Separation of solid impurities takes place, leaving a sodium aluminate liquor from which alumina hydrate settles out and is subsequently calcined. The plant includes grinding machines, digesters, decomposition tanks, rotary calciners, and accessory plant such as pumps and conveyors. A large supply of steam is necessary for the process. The carbon works at Kinlochleven supply the electrodes necessary for three factories in the north of Scotland, and a description is given of the various raw materials used and their conversion into baked electrodes by grinding, mixing whilst hot with a binder of tar and pitch, pressing under 2,000 tons pressure, and baking in producer-gas-fired furnaces.

The electrolytic furnaces used to produce aluminium from alumina are similar in principle at the Foyers, Kinlochleven, and Lochaber factories, and as the last is the latest factory erected in the north, a short description of the hydro-electric power system is given. Ultimately the power house will contain some 120,000 h.p. of generating plant. At present 33,000 kW is installed. The cost of the complete development at Lochaber will be in the neighbourhood of £4,500,000.

# New Apparatus and Devices

## for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

### A Magnetic Clutch

The "C.B." magnetic clutch, recently introduced by MESSRS. THOMAS BROADBENT & SONS, LTD., Central Ironworks, Huddersfield, consists of two members, referred to as the "driver" and the "driven." The driver is that half of the clutch in which are embodied the magnetising coil and slip-rings for feeding it, and the driven is mounted on a spring steel plate, the engagement and disengagement of the friction surfaces depending upon the action of its flexibility.

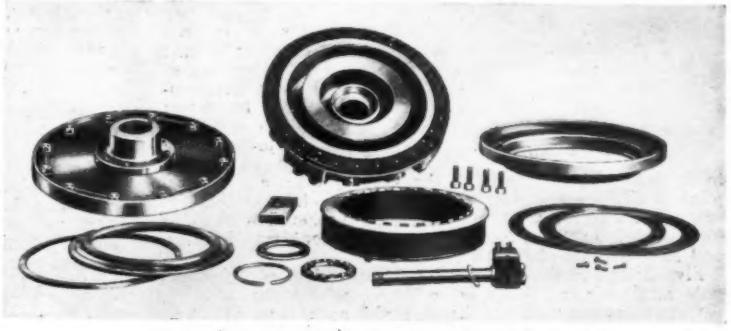
When the driver member of the clutch is magnetised by means of current passing through the coil, the other half is attracted to it, this movement being made possible by the flexibility of the steel disc already referred to. When the clutch is de-energised, the steel plate springs back to its original position, breaking direct contact between the driver and the driven. No lubrication is required in connection with the moving parts of the clutch, there being no splines or sliding members.

To prevent any possible end thrust, a thrust bearing is fitted, consisting of a ball thrust bearing, secured in position by a sprung ring, and acting between the driver and driven member of the clutch, being quite independent of the relative position of the shafts to which either member of the clutch is fitted.

The clutch friction lining consists of "Ferodo" material, and adjustment of this lining to take up any wear can be readily made while the clutch is in position, without disturbing its mounting in any way, adjusting set-screws being provided for this purpose. Further, the renewal of the friction lining takes only a few minutes.

The portion of the frame carrying the friction lining does not form part of the magnetic circuit, thereby enabling a friction lining of greater thickness than usual to be fitted, and so reducing the renewal of friction linings to a minimum. The friction linings are mounted on cast steel members, and any possible distortion which may be caused by hammering when riveting new linings is eliminated.

The clutches, which are for d.c. only, can be supplied in various sizes, ranging from 6½ in. to 81 in. diameter in coupling form for direct drives, or for belt, gear or chain drives.



**The components of the Broadbent magnetic clutch**

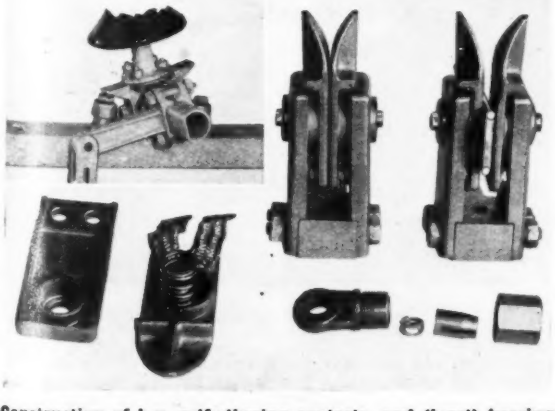
### An Outdoor Disconnecting Switch

A new range of high-voltage air-break switches which has just been introduced by SWITCHGEAR & EQUIPMENT, LTD., 49, Queen Victoria Street, E.C.4, incorporates three important improvements designed to ensure ease of operation after lengthy periods of idleness. A high-pressure self-aligning contact overcomes the difficulty that has been experienced in the past with knife-blade contacts due to excessive friction.

Two massive contact jaws are pivoted on two heavy contact blocks so as to be free to move in every direction, and phosphor-bronze compression springs are employed to maintain the jaws in contact when the switch is open. The jaws are "horned" in such a manner as to provide free and easy access of the switch blade into position where a high contact pressure is maintained. When the switch is open, the contact jaws are closed and thus protected from the atmosphere. Furthermore, the contacts are proof against snow and ice conditions, since, by reason of the peculiar shape of the horned jaws, only a small amount of ice or snow could be deposited under the worst possible conditions, and this could be easily dislodged by the normal action of the blade, forcing any such deposit through the jaws of the contacts as they opened to admit the blade. The contact blocks and jaws are made from hot brass pressings, and the whole arrangement is very substantial and flexible.

A new bearing comprises two substantial malleable-iron castings supporting a gunmetal bush of about 2½ in. in diameter. The phases of the switch are coupled together by passing a heavy drawn steel tube of "D" section through the gunmetal bushes and clamping them by a simple clamping screw with a suitable locking device. The lower casting incorporates two spring-loaded buffer stops, which are brought into action as the upper casting, which carries the insulator upon which the switch blade is mounted, rocks over from the "open" to the "closed" position and *vice versa*. This relieves the rocking insulator of that sharp jar which is likely to cause insulator head breakages.

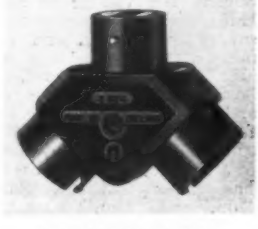
A new stirrup-type operating handle has been evolved, incorporating an easily operated turnbuckle with right- and left-hand threads for final adjustments of the length of operating rod, and a universal joint which compensates for lack of alignment between the operating lever on the phase coupling shaft and the position of the handle at the foot of the pole.



**Construction of h.p. self-aligning contacts, and (inset) bearing with "D" tube coupling**

### A "Bakelite" Adaptor

A new adaptor in "Bakelite" and enabling two lamps to be lighted from a single socket has recently been placed on the market by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. The price is £1 per dozen.



**The G.E.C. adaptor**

### A New "Laundwell" Iron

A second "Laundwell" iron has just made its appearance. It is of similar construction and finish to the older model, but is smaller, the weight being only 4½ lb. and the loading 400 W, as compared with 5½ lb. and 450 W for the original "Laundwell." The price, too, is 1s. 3d. lower—*i.e.*, 12s. 6d. nickel-plated and 15s. 3d. in chromium. For 2s. 9d. extra it can be obtained with a signal connector which lights up when the iron is on circuit. The manufacturers are PREMIER ELECTRIC HEATERS, LTD., Keeley Street, Birmingham.

### Asbestos-covered Flexibles

The LONDON ELECTRIC WIRE COMPANY & SMITHS, LTD., Playhouse Yard, Golden Lane, London, E.C.1, has sent us a booklet describing an extensive new range of fire-resisting flexibles and cables. The insulation of this new line is of "Lewbestos," and consists of asbestos fibre uniformly applied to the conductor; when additional dielectric strength is required, the flexibles are coated with varnished cambric, which has a working temperature of 110 deg. C. as compared with 65 deg. C. in the case of vulcanised rubber.

Panel wiring cables insulated with varnished cambric or "Lecite" are available, both having a sheathing of "Lewbestos" insulation with an overall plain or multi-coloured braiding.

### Battery Chargers, Eliminators and Rectifiers

During a recent visit to the works of SUPREMUS SPECIALITIES, LTD., 118, High Street, Erdington, Birmingham, we saw the results of specialisation in the manufacture of battery eliminators for a.c. supplies, h.t. and l.t. battery chargers and allied equipment.

Of the range of "Supremus" h.t. eliminators for a.c. mains there are four with "Bakelite" mottled walnut cases which are supplied complete with flexible leads, adaptors and plugs. With outputs of 12, 20, 25 and 4 mA, these models have voltage tappings varying from 60 V to 120 V for the smallest model

to 40 V to 150 V for the largest equipment which costs £2. There is also a larger model with a crystalline stove enamelled metal case. It has outputs of 35 and 60 mA and voltage tappings from 20 V to 200 V.

The standard rectifiers are designed for 230 V d.c. output, and are fitted with tappings whereby it is always possible to obtain the correct d.c. voltage within five per cent. over a wide range of current. There are five models, the smallest being tapped for three outputs from 5 to 35 mA, and the largest having nine tappings for from 180 to 250 mA. The prices range from £1 1s. 6d. to £5 unsmoothed. Fuses on the primary sides can be supplied at slight extra cost. Westinghouse metal rectifiers are employed. Two rectifiers for moving-coil speakers are arranged for direct from the mains operation (without transformers) and have outputs of 60 and 120 mA.

**An E3 battery charger**

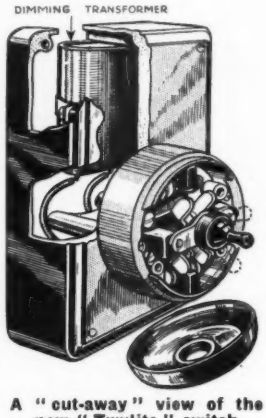
Five models in the range of h.t. battery chargers have outputs varying from 120 mA (30 to 180 V) to 1.5 A (30 to 160 V). An extensive range of l.t. chargers with outputs up to 5 A at 6 to 60 V, includes a ½-A trickle charger which operates at 2, 4 and 6 V, and is available in an attractive "Bakelite" case. It costs 16s. 6d. net and the largest model is priced at £17 5s. Except for the one mentioned they are all supplied in metal cases with crystalline enamelled finishes.

A range of mains transformers for all-mains sets will also be available shortly.

## The "Twylite" Switch

The latest development of MESSRS. WARD & GOLDSTONE, LTD., Pendleton, Salford, in the domestic field is the "Twylite" switch, an illustration of which appears herewith.

This device, which is priced at 6s. 6d., embodies at the back of a switch a transformer which reduces the voltage to about half with a corresponding saving in current, and dimming of the light. It is suitable for nurseries, corridors, hospitals, halls, landings, &c., and models are available both for 200/250 V and 100/110-V supplies. Control is by means of a change-over switch, which has three positions, "off," "on," and "dim."

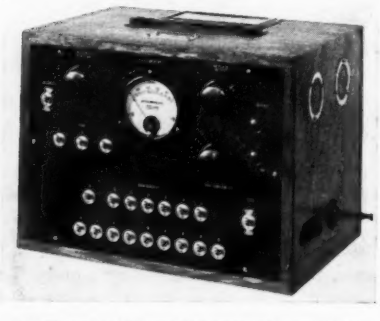



**A "cut-away" view of the new "Twylite" switch**

## An Audio-frequency Tester

A large number of measurements and tests on speech- and music-reproducing equipment and component apparatus necessitates the use of a variable audio-frequency source which covers the whole musical range. The new mains-operated audio-frequency oscillator of STANDARD TELEPHONES & CABLES, LTD., Connaught House, Aldwych, W.C.2, is very suitable for the purpose. The frequency range covered is from 20 to 10,000 cycles, a calibration being provided which covers the whole range in suitable steps.

The power output is of the order of 20 milliwatts and the measured level of the r.m.s. value of all the harmonics taken together is between 30 and 34 decibels down on the output wave (2 to 3 per cent. voltage) over the greater part of the frequency range, it is stated. The frequency stability is within ±0.2 per cent. over the whole range after a normal heating-up period. It operates off a.c. mains of all usual voltages and incorporates a high-voltage rectifier and smoothing circuits, the latter providing a generous margin, the hum level being approximately 60 db. down (0.1 per cent.) on the maximum output. If the oscillator is operated from controlled 50-cycle mains its frequency can be checked in terms of the mains frequency at every 50 cycles up to 2 or 3 kc., an accuracy within ±0.2 per cent. being attained.



**A "Standard" mains-operated oscillator**

The circuit employs three valves, the first of which is the oscillator proper, and the second the output valve, whose function is to isolate the oscillator so that no variation in the output circuits affect the frequency generated; the third is the high-voltage rectifier. The construction follows the conventional radio receiver practice, a metal chassis carrying all the components and sliding into an oak containing case fitted with a carrying handle.

This is the first of a series of simple audio-frequency testing sets designed by the company with a view to providing inexpensive but efficient apparatus for making measurements on microphones, amplifiers, loud speakers, and similar apparatus. Other items at present available include a thermo-milliammeter and a variable attenuator.

## New Osram Valve

The GENERAL ELECTRIC CO., LTD., announces the introduction of a new type of valve known as the double diode triode, "Osram" M.H.D.4, which has been developed (1) to overcome distortion due to detector overload, which is common with grid-leak detectors when receiving loud signals; (2) to overcome the drawbacks of fading, particularly at night-time; and (3) to simplify tuning by permitting reception of large numbers of transmitting stations of varying degrees of strength on the aerial at equal volume, the level of which can be manually adjusted to suit individual requirements.

**The double diode triode "Osram" radio valve**

Double diode and triode electrode systems surround a common cathode. The diode section of a valve can be employed either for half- or full-wave rectification, and the diode section used as an l.f. amplifier of the rectified signal. The great advantage of this form of valve over the ordinary grid-leak detector is that the strength of signal which can be handled by the diode without overload is greater; also the triode element operates as a true l.f. amplifier with negative bias on the grid instead of partly rectifying and partly amplifying, as a triode detector does.

The advantages of the M.H.D.4 are still further extended when either the diode rectifier system alone, or the diodes in conjunction with the triode, are utilised in circuits designed for providing automatic volume control.

The characteristics of the new valve are: Filament voltage, 4 V; filament current, 1 A; amplification factor, 40; impedance, 18,200 ohms; mutual conductance, 2.2 mA/volt. The price is 15s. 6d.

## The "Kitchenetta"

One of the most useful pieces of apparatus for the kitchen is a motor which can be used to drive a number of different

**The complete "Kitchenetta" equipment**

accessories, and thus save the laborious work of beating eggs, sharpening knives, &c. A machine for this purpose is the "Kitchenetta." Of American origin, it is now being sold in this country by MESSRS. A. C. GILBERT & CO., 109, Kingsway, London, W.C.2, at the price of £9 6s. It embodies a small motor with equipment which will chop food, beat batters, mix drinks, extract juices, mix mayonnaise, sharpen knives, grind coffee, and crack ice. The comprehensive nature of this handy equipment can be judged from our illustration.

# E.D.A. to be Reorganised

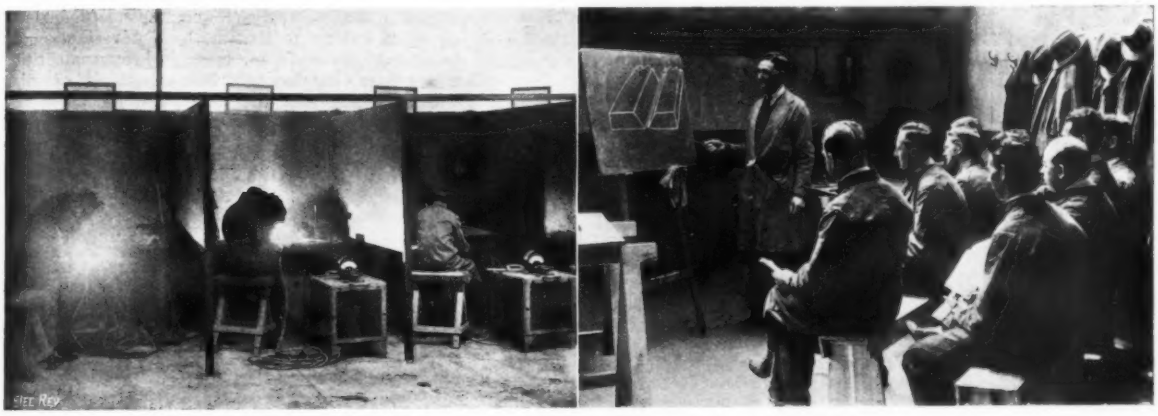
## Reconstruction unanimously adopted by the Council

FOR some time past important deliberations have been in progress regarding the future of the British Electrical Development Asssociation, Inc.

At an adjourned meeting of the Council held in London on May 31st a number of proposals made by the General Purposes Committee were carried unanimously. They are referred to in our leading article to-day. The following is a summary of the report adopted by the Council :—

It has always been one of the principal aims of the Council to find means for greatly extending the value and usefulness of the Association to the whole electrical industry of this country. It has also been apparent that any substantial expansion of activities was dependent on a large increase in financial resources. This important question of funds for national publicity work has recently been receiving the attention of the Central Electricity Board, and, on April 30th, a communication was received from the Chairman of the Board inviting the General Purposes Committee to meet the members of the Board for consultation and discussion.

The Committee accordingly accepted this invitation and the conference was held on May 9th, when Sir Andrew Duncan, on behalf of the Board, made an important statement, outlining proposals which, it was believed, would lead to a large increase in the financial resources of the Association, and thus enable it to carry out its functions more successfully. Sir Andrew expressed the appreciation felt by his Board of the excellent and effective work carried on by the Association with the limited means at its disposal, and explained that his Board—being deeply interested in the expansion of the electricity supply industry—had requested their National Consultative Committee to inquire into the whole subject of the enlargement of the public knowledge of the uses and services of electricity and its development generally, and to report thereon. He further stated that, as a consequence of the report of the National Committee, the Board had decided to submit proposals to the Association, under which it was contemplated there would be a sufficient sum available for the work of the Association.



The Murex welding school for operators, supervisors, and designers

### The Scheme Outlined

These proposals were fully discussed by the Board with the General Purposes Committee, who make the following recommendations to the Council of the Association :—

"(1) That the Association should continue to be the body responsible for this particular work, under its present title, but should be reconstituted so that membership would consist solely of authorised electricity supply undertakings.

"(2) That the qualification for membership (including that of the Central Electricity Board) should be an annual contribution on such assessment as may be determined by the Council from time to time.

"(3) That, until decided otherwise, the present basis of assessment should be continued.

"(4) That the Association should be controlled by a Council, drawn only from members of the Association, and composed as follows :—

| Nominated by. | Number. |
|---|---|
| The Central Electricity Board (from their National Consultative Committee) ... ... ... ... | 6 |
| The Incorporated Municipal Electrical Association ... | 5 |
| The Incorporated Association of Electric Power Companies ... ... ... ... ... ... ... ... | 2 |
| The Provincial Electric Supply Association ... ... | 1 |
| The London Electricity Supply Association ... ... | 1 |
| The Joint Electricity Authorities ... ... ... ... | 1 |

(Four of the above sixteen ordinary members to retire annually, by rota, but to be eligible for reappointment.)

The Council shall have power to co-opt. In addition, each provincial Area Committee of the Association should be entitled to representation on the Council by the chairman for the time being, or other nominee.

"(5) That provision should be made for such revision of the Council constitution as may be found necessary, from time to time, in the light of the then prevailing circumstances.

"(6) Your Committee further recommends, in view of the great increase in the Association's activities which will follow reorganisation, that the first duty of the new Council should be the consideration of methods for strengthening the administration."

While recognising that these proposals constitute a fundamental change in the principle on which the Association was established, your Committee is firmly convinced that they are in the best interests of national electrical development. The present year will see the completion of the national grid, and it is the desire of the whole electrical industry that it should be the starting-off point of a great advance in electrical development. Your Committee believes that reorganisation of the Association on the lines suggested can alone create the enthusiasm and provide the funds which are essential to give the hoped for impetus to development.

With the object of providing for a continuance of co-operation between the Council and sections of the industry not represented thereon, it is proposed that a Standing Co-operation Committee should be set up, on which representatives of the Council will meet all other sections in the industry, and it is hoped that by this means the collaboration and good feeling which have existed throughout the life of the Association will be ensured after the reorganisation.

An extraordinary general meeting of members will be called as soon as practicable for the consideration of amended articles of association.

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### The Unification of Radio Research

THE facilities for radio research carried out by the Department of Scientific and Industrial Research on the advice of its Radio Research Board have been improved by the unification of the Wireless Division of the National Physical Laboratory and the Department's radio research station at Slough into a new Radio Department of the N.P.L. Mr. R. A. Watson Watt, hitherto the superintendent of the radio research station, is the superintendent of the new department. The Radio Research Board will continue to be appointed as at present by the Lord President of the Council, and its constitution and functions remain unchanged, except that the opportunity has been taken to remove the anomaly by which the general work on the maintenance of radio standards at the N.P.L. was a responsibility of the Board. In future the executive committee of the N.P.L. will assume direct responsibility for these standards in the same way as it assumes responsibility for other national standards. The unification which has taken place gives the Radio Research Board much greater freedom in planning its programme as a single unit. The amalgamation of the staffs of the two sections under a single direction is in the interests of efficiency and economy, and enables inquiries from industry to be made to one single establishment.

# Trade Prospects in Belgium

IN common with that of other countries, Belgian industry had a bad year and there has been an all-round decline in trade, states a Department of Overseas Trade on economic conditions in 1932. The proportion of imports from the United Kingdom slightly increased in value, however, and the country has resisted the general depression as well as, if not better than, many others, more hopeful signs being apparent towards the end of the year.

The Belgian market for electrical apparatus and appliances is important, local firms being interested in many electrical enterprises, not only within the country, but also in the Congo and other parts of the world, as for example the "Empain" group, "Sofina," "Electrobel," etc. A number of important schemes are under consideration, but no progress is being made with them at present.

## Benefits of Deflated Sterling

The fall in sterling has induced certain firms to consult United Kingdom electrical engineering concerns, and, if it has not led to much actual business, has at any rate developed an interest in British products. British machinery has a good reputation and prices are now competitive, but it is necessary to work the ground tirelessly and make the goods known by publicity. It is thought advisable that firms of standing should have their own offices in Belgium and work under their own name rather than under that of agents.

In order to keep their factories working many local electrical manufacturers have been obliged to sell their products at cost price. The figures below, taken from the official returns, detail the trade in the main classes of electrical goods.

Although there was a heavy decline in the imports of dynamo-electric machines, Belgium is still a larger importer than exporter of such plant. Exports of cable and wire continue far ahead of imports. In the foreign trade in telegraph and telephone apparatus the balance shifted. Whereas in 1931 exports were at about the same level as imports, last year they were less in value than imports by about 50,000,000 fr. (120 Belgian fr. equal £1 approximately).

## The Growing Domestic Market

The effects of the general crisis have been felt considerably by the electricity supply industry. About 80 per cent. of its production is supplied to industrial concerns, and the reduction of their activity has naturally had its repercussion on the sale of electricity. Some compensation for the slackening demand has, however, been found in the increase in the sale of energy for domestic use and in agricultural districts, where electricity is being used more and more for farm machinery. Efforts are being made to develop the use of electricity for domestic purposes by the introduction of special tariffs, and by intensive campaigns carried out by distributors, in collaboration with manufacturers and contractors.

Hitherto British manufacturers have taken little interest in the radio market, but the depreciated pound has opened up an important outlet for British firms both in sets and parts, although there are possibilities of increased import duties. Imports of radio valves from the United Kingdom were quadrupled in quantity and trebled in value during the period under review.

British firms wishing to enter the Belgian market must be prepared to meet a good deal of competition. Local industry is well developed in many directions, and Belgian products, if not quite equal in quality to British, have nevertheless the merit of cheapness. In addition, there is keen competition from other countries, in particular Germany. Preparation should, however, be made for the time when the depression lifts and business revives; the more so as the present rate of sterling renders United Kingdom goods competitive and opens the market to new products whose price was hitherto too high.

### Imports

| | 1932. Fr. (Thous.) | Inc. or dec. as compared with 1931. Fr. (Thous.) |
|---|---|---|
| *Dynamo-electric machines—* | | |
| Total | 57,800 | − 45,700 |
| From Germany | 23,900 | − 14,800 |
| „ France | 6,500 | − 9,200 |
| „ Sweden | 8,400 | − 5,600 |
| „ Switzerland | 5,900 | − 10,400 |
| *Dry batteries—* | | |
| Total | 5,700 | − 1,800 |
| From Germany | 1,400 | − 500 |
| „ Denmark | 2,900 | − 1,300 |
| *Accumulators and plates—* | | |
| Total | 2,900 | − 3,400 |
| From United Kingdom | 700 | − 800 |
| „ France | 400 | − 1,400 |
| „ United States | 1,300 | − 800 |
| *Cables, submarine and underground—* | | |
| Total | 1,700 | − 8,800 |
| From Germany | 1,500 | − 8,700 |
| *Other insulated wire and cable—* | | |
| Total | 7,100 | − 5,900 |
| From Germany | 3,600 | − 5,400 |
| *Measuring instruments and parts—* | | |
| Total | 12,500 | − 5,100 |
| From Germany | 4,500 | − 500 |
| „ Switzerland | 7,100 | − 2,900 |
| *Carbons—* | | |
| Total | 4,900 | − 1,600 |
| From Germany | 900 | − 1,700 |
| „ United States | 1,900 | − 500 |
| *Wireless valves—* | | |
| Total | 23,900 | + 3,300 |
| From Holland | 12,800 | − 1,900 |
| *Insulators—* | | |
| Total | 3,400 | − 2,000 |
| From Germany | 700 | − 900 |
| „ France | 2,500 | − 800 |
| *Metal-filament lamps, gas-filled—* | | |
| Total | 10,300 | − 2,700 |
| From Germany | 1,400 | − 800 |
| „ Hungary | 3,200 | + 1,100 |
| „ Holland | 4,900 | − 1,700 |
| *Vacuum—* | | |
| Total | 18,500 | − 5,500 |
| From Germany | 5,700 | − 2,900 |
| „ Holland | 7,500 | − 1,800 |
| *Telegraph and telephone apparatus—* | | |
| Total | 128,000 | + 9,000 |
| From Germany | 42,200 | − 3,500 |
| *Electrical apparatus not elsewhere specified—* | | |
| Total | 118,500 | − 62,500 |
| From Germany | 50,800 | − 28,200 |
| „ France | 24,300 | − 13,700 |

### Exports

| | 1932. Fr. (Thous.) | Inc. or dec. as compared with 1931. Fr. (Thous.) |
|---|---|---|
| *Dry batteries—* | | |
| Total | 300 | − 2,200 |
| *Dynamo-electric machines—* | | |
| Total | 33,100 | − 13,200 |
| To Congo | 3,300 | − 3,900 |
| „ Argentina | 2,200 | − 2,900 |
| „ Holland | 2,400 | − 2,600 |
| „ China | 2,800 | + 100 |
| *Accumulators and plates—* | | |
| Total | 4,200 | − 6,800 |
| To Holland | 1,500 | − 500 |
| „ Spain | 100 | − 1,400 |
| *Submarine and underground cables—* | | |
| Total | 21,400 | − 11,100 |
| To United Kingdom | 3,200 | − 7,100 |
| „ Holland | 1,000 | − 4,300 |
| „ Germany | 2,700 | − 900 |
| *Other insulated wire and cable—* | | |
| Total | 26,600 | − 17,400 |
| To India | 2,600 | − 400 |
| „ Holland | 2,400 | − 3,000 |
| „ United Kingdom | 7,400 | − 7,600 |
| *Metal-filament lamps—* | | |
| Total | 14,100 | − 7,900 |
| To Holland | 3,300 | − 1,100 |
| „ United Kingdom | 1,000 | − 5,700 |
| *Telegraph and telephone apparatus—* | | |
| Total | 79,000 | − 43,000 |
| To Holland | 17,300 | + 3,100 |
| „ Switzerland | 27,100 | + 1 700 |
| *Electrical apparatus not elsewhere specified—* | | |
| Total | 29,400 | − 13,000 |
| To Holland | 3,500 | − 2,500 |
| „ Switzerland | 6,800 | − 1 200 |

# Electrical Imports of British Malaya

BELOW are given the values of the imports of electrical and allied material into British Malaya last year, together with notes of increases or decreases as compared with 1931. The Straits dollar at par equals about 2s. 4d.

| | 1932. $ | Inc. or dec. as compared with 1931. $ |
|---|---|---|
| *Batteries and accumulators.—* | | |
| Total | 624,700 | − 168,300 |
| From United Kingdom | 87,000 | − 43,000 |
| „ British Dominions | 43,300 | − 6,700 |
| „ Europe | 5,100 | − 7,600 |
| „ United States | 437,000 | − 110,000 |
| *Electrical instruments other than telegraph or telephone—* | | |
| Total | 24,800 | − 16,900 |
| From United Kingdom | 24,400 | − 13,600 |
| *Rubber insulated wire and cables—* | | |
| Total | 526,100 | − 159,900 |
| From United Kingdom | 496,300 | − 183,700 |
| „ Europe | 23,500 | + 18,900 |
| *Radio instruments and apparatus—* | | |
| Total | 126,500 | − 53,500 |
| From United Kingdom | 94,300 | − 36,700 |
| „ Europe | 10,800 | + 2,800 |
| „ United States | 20,100 | − 16,400 |
| *Generators—* | | |
| Total | 64,800 | + 22,800 |
| From United Kingdom | 42,200 | + 1,300 |
| *Telegraph and telephone instruments and apparatus—* | | |
| Total | 80,800 | − 789,200 |
| From United Kingdom | 79,000 | − 789,000 |
| *Electric lamps—* | | |
| Total | 189,000 | − 26,000 |
| From United Kingdom | 86,500 | + 31,100 |
| „ Europe | 44,200 | − 39,800 |
| „ United States | 22,900 | + 10,000 |
| „ Japan | 17,200 | − 31,600 |
| *Flash lamps—* | | |
| Total | 93,000 | − 78,000 |
| From United Kingdom | 1,300 | — |
| „ Europe | 400 | − 1,800 |
| „ United States | 16,500 | − 12,500 |
| „ Japan | 2,100 | + 100 |
| „ British Dominions | 14,400 | − 59,600 |
| *Lighting accessories and fittings—* | | |
| Total | 151,000 | + 51,000 |
| From United Kingdom | 131,400 | + 61,400 |
| „ Europe | 13,400 | − 100 |
| „ United States | 200 | − 1,000 |
| Japan | 4,900 | − 4,300 |
| *Electrical goods and apparatus not elsewhere specified—* | | |
| Total | 452,000 | − 191,000 |
| From United Kingdom | 396,200 | − 188,800 |
| „ Europe | 17,000 | − 14,000 |
| „ United States | 31,300 | + 13,000 |
| „ Japan | 2,400 | + 900 |
| *Transformers and convertors—* | | |
| Total | 50,700 | − 144,300 |
| From United Kingdom | 50,100 | − 127,900 |
| „ United States | 500 | − 900 |
| *Motors—* | | |
| Total | 68,900 | − 84,100 |
| From United Kingdom | 62,200 | − 59,800 |
| „ Europe | 3,800 | − 18,200 |
| „ United States | 2,900 | − 6,100 |
| *Electrical machinery not elsewhere specified—* | | |
| Total | 447,000 | − 137,000 |
| From United Kingdom | 307,000 | − 163,000 |
| „ Europe | 116,000 | + 92,000 |
| „ United States | 23,800 | − 64,800 |

# New Books

**Television, To-day and To-morrow,** by SYDNEY A. MOSELEY and H. J. BARTON CHAPPLE. 3rd edition. Pp. 198; illus. London: Sir Isaac Pitman & Sons. Price: 7s. 6d.

The first edition of this work was reviewed in our issue of May 25th, 1930. The views then expressed that the omission of certain portions and that the inclusion of fuller treatment of photo-electric cells and neon lamps would be of advantage apply far less to the new edition, since for the most part these modifications have now been effected, but the historical portion remains unduly detailed with lengthy quotations.

The further progress, here recorded, marks the immense advance due to the larger and rectangular screen, in conjunction with the so-called grid cell and a black and white image, now practicable with comparatively little sacrifice in simplicity of construction of the televisor; but the references to radio receivers, while calling for a minimum undistorted output of 1½ W, hardly make sufficiently clear that special circuits are, in fact, necessary for successful reception of television transmissions. While the vital need of greater detail in the reproduced image is mentioned, it is insufficiently emphasised, seeing that this is now perhaps the one thing needed before television can make a wide appeal.

The progress achieved in transmission by the use of ultra-short waves, making possible an increase in detail, and in reception by the modulated arc and big screen thus rendered practicable, together with the thirty-mirror drum, are lucidly recorded and afford increased interest. The section dealing with the constructional arrangement now covers the utilisation of more modern valves, while the increase in the number of diagrams of connections and of working data form a valuable addition, but, unfortunately, the methods of connecting neon lamps remain vague and liable to mislead. The general arrangement and advantages of zone apparatus are well described.

Notwithstanding that the merit of including the picture on page 164 is obscure, the many illustrations and diagrams are excellent, well varied, and informative. Considered as a whole, the latest edition is immeasureably improved, remains well arranged, and, although there is some needless repetition, it provides instructive reading of great interest.

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**Theory of Thermionic Vacuum Tubes.** By E. L. Chaffee. Pp. 652. Figs. 358. London: McGraw-Hill Publishing Co. Price 36s.

This is one of a series of electrical engineering text-books issued under the supervision of a committee of electrical engineers of which the Dean of the Engineering School of Harvard University is chairman and consulting editor. Dr. Chaffee is Professor of Physics at Harvard; he was a well-known worker in the wireless field in the days before the thermionic valve, and his name was at one time associated with a certain type of quenched gap.

The book under review deals only with fundamental principles and not with the multifarious circuits in which the vacuum tube may be used. Furthermore, it is confined to low-power vacuum tubes and does not touch upon high-power amplifiers and oscillators, nor does it contain any mention of the magnetron or of Barkhausen and Kurz. It is primarily a text-book based upon the notes for a course of lectures given at Harvard since 1922, but it will also serve as a reference book, for it is a mine of information on patent specifications and original articles, numerous references to which are given in footnotes.

The author's list of symbols runs to four and a half pages and some of them are very unorthodox. His term variational resistance for $\delta V/\delta I$ is new to us; it is somewhat less academic than differential resistance, more dignified than slope resistance, and more accurately descriptive than a.c. resistance.

The book is well written, and the printing, diagrams and general arrangement are all that could be desired; it is a book which can be unreservedly recommended to those who wish to know all that there is to know of the theory of the ordinary low-power thermionic valve and its simple applications.

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**A Text-book of Wireless Telegraphy and Telephony,** by W GREENWOOD. Pp. 307. London: University Tutorial Press, Ltd. Price: 5s. 6d.

This is the second edition of a text-book which is intended for the use of those who understand the principles of electrical engineering but are not radio engineers, and of physics students who have already acquired a knowledge of magnetism and electricity. The mathematics is not too advanced.

Limited space has prevented the author from describing apparatus, but the inclusion of a little more practical detail would have been helpful. We should like to have seen more space devoted to broadcasting and short-wave communication, especially the latter, which receives very scanty treatment. Altogether, modern developments might well have received more extensive consideration. Valve transmitters are given only ten pages, frequency control one page, and superheterodyne reception one paragraph. Directional developments for short waves are hardly touched upon, and it is stated, incorrectly, that "several stations employing a beam of very short waves have now been erected round the coast of Great Britain."

The chapter on measurements is good, so far as it goes, and so is the concluding chapter on calculations. The book is well set out and the diagrams are good.

* * *

## Shorter Notices

"Patents Explained," by H. J. W. Wildbore. Pp. 48. Price 5s.—This book, which is published by the author, a patent agent, is an explanation of the patent law in simple language written for the benefit of the layman generally and more especially the manufacturer, the merchant and inventor. It should sufficiently enlighten any lay reader to enable him to discriminate between inventions that are patentable and ideas which are ineligible for protection and to know how to approach the problem of seeking protection and of exploiting to best advantage the protection when obtained.

"Motor Car Batteries," by A. H. Lindley-Jones. Pp. 86. London: Percival Marshall & Co., Ltd. Price 1s. 6d.—This is a concise explanation of the fundamental principles of accumulators for automobiles, and it also deals with the means of keeping them in good condition. The author has treated the subject from the point of view of the automobile engineer and the garage proprietor. The final chapter is devoted to charging and repair work.

"The Table in a Roar" (Methuen & Co., 3s. 6d. net) is a collection of after-dinner stories by Mr. James Ferguson, principal of James Ferguson & Sons, Ltd., Merton Abbey, S.W.19. It includes many stories which we would like to quote, and the author has been fortunate enough to secure the collaboration of H. M. Bateman and George Belcher as illustrators—to say nothing of a preface by E. V. Lucas.

"Estimating for Mechanical Engineers," by W. V. Secar. Pp. 69. Illus. London: Draughtsman Publishing Co. Price 3s.—The subject is dealt with in a clear way and diagrams are included wherever necessary.

*Punch* has sent us a copy of his Summer Number (1s.), which is again a feast of wit and colour.

# In the Courts

IT has been decided that when the important action brought by Marconi's Wireless Telegraph Co., Ltd., against Philips Lamps, Ltd., comes before Mr. Justice Maugham in the Chancery Division on June 13th next, for which day the hearing of the action has been fixed, the judge is to have the assistance of an assessor who will sit with him for the purpose of instructing him on any abstruse technical matter which may arise in the course of the hearing, which, it is expected, will last for several days.

### A Claim for Shares

In the King's Bench Division last week Mr. Justice du Parcq had before him an action by Mr. F. T. Jenkins, consulting engineer, St. Stephen's House, Westminster, against Mr. W. J. Davy, Croydon, claiming the delivery (or alternatively damages) of 100 £1 shares held by the defendant.

The defendant, it was said, was the inventor of a mercury device used in connection with electricity, and plaintiff alleged that under an agreement of July, 1931, defendant agreed to give him 10 per cent. of any shares allotted to defendant in any company formed through plaintiff's introduction of capital to exploit the device.

Plaintiff's case was that he and others found the necessary capital and a company was formed with £4,000 in £1 shares, of which the defendant received 1,000, and plaintiff said the defendant now refused to carry out the agreement. The defendant denied any arrangement as suggested, and alternatively pleaded that if any agreement to pay plaintiff was made it was in connection with a much larger company which never materialised.

It was stated that the shares were now worth over £5 each, and his Lordship, after hearing the evidence, held that the plaintiff had failed to make out his case, and gave judgment for the defendant with costs.

### A Disputed Account

On June 1st Mr. C. M. Pitman, the Official Referee, delivered judgment in an action brought by Handlecrafts, Ltd., manufacturers of radio components, of Putney, S.W., against the Kniveton Cable Works, Ltd., Ponders End, Middlesex, to recover £117 14s. 5d. for goods supplied to the defendant company. The goods in question consisted of electrical plugs, terminals for h.t. batteries, and insulated pins for securing electrical wires.

The defence was that the plaintiffs warranted that the goods were fit for the purpose for which they were required and that certain of the goods were defective, which entitled defendants to reject them. Defendants further alleged there had been short deliveries of some of the goods ordered.

The Official Referee, after taking into consideration the amounts due to the defendants for rejects and short deliveries, gave judgment for the plaintiffs for £88 13s. 8d., with costs on the High Court scale.

# Business and Industrial Notes

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures**

## Hotel Floodlighting

The Esplanade Hotel, Scarborough, a picture of which appears below, occupies a prominent position in the town and lends itself admirably to floodlighting. The installation was carried out by Messrs. Drake & Gorham, Ltd., Manchester branch, who used four Holophane "H.F. 1,000" projector units with 1,500-W lamps, and two "F.L.500.E" Holophane

**An example of effective floodlighting at the Esplanade Hotel, Scarborough**

projectors with 500-W lamps. The four larger units are fixed on four oak posts, facing the front of the building, and 30 ft. apart. The two smaller units are on trees, to illuminate the right-hand portion of the building.

## Electrical Publicity at Reigate

The Reigate Electricity Committee has announced a big "drive" to popularise electricity for domestic purposes. Premises for municipal showrooms have been rented at Linkfield Corner—a site handy to both Reigate and Redhill. The borough electrical engineer has been authorised by the Council to embark on a campaign of direct mail and newspaper advertising and to have a stamping machine converted to imprint all Corporation correspondence with slogans advertising electricity.

It has also been agreed that in the case of small houses wired by the Corporation on the hire-purchase system, and not eligible to come under the two-part tariff, electricity for cooking purposes shall be supplied at ½d. per kWh instead of the present charge of ¾d. per kWh. Where larger service cables are needed, in the cases of houses wired at present only for lighting, they will, subject to the consent of the Electricity Commissioners, be laid without any cost to the consumer. Another innovation is the payment of 5s. to registered local electrical contractors for each order obtained for the hiring of an electric cooker. Orders for wiring are to be given to members of the local branch of the Electrical Contractors' Association in rotation.

## The B.E.A. Handbook

The British Engineers' Association has published the 1933 edition of its "Classified Handbook of Members and their Manufactures." This directory, which is being circulated to selected known buyers of engineering products in the home and overseas markets, is a useful guide to the principal engineering concerns in this country, and its utility is increased by a classified list of the manufactures of B.E.A. members.

## New Electricity Showrooms

The Shropshire, Worcestershire and Staffordshire Electric Power Co. has opened new showroom premises in Henly Street, Stratford-on-Avon.

The Swindon Electricity Committee is to invite tenders for the erection of an electricity showroom in Regent Circus.

## The Timber Market

Our Timber Trade Correspondent reports that the little boom in the housebuilding trade is a great help to the wood trade whilst general industry is so quiet. Prices for wood have strengthened considerably both on account of good demand compared with supplies and because of the embargo on Russian wood. The latter, however, is partly lifted, Soviet timber being permitted into this country under certain conditions. Hardwoods are arriving very slowly this year, and stocks in the country are light. Against that, the demand is increasing a little both here and in the United States, whence we receive the bulk of our imported requirements. Prices are therefore stiffening, and this state of affairs is likely to continue. Owing to a rising demand on short supplies mahogany logs also are strengthening in value.

## Rubber Insulated Wires

We have received from Mr. Percy Rosling, M.I.E.E., in pamphlet form, a brief essay on "Rubber Insulated Wires and Cables for Electric Light and Power Installations."

## A Starter Battery Association

A British Starter Battery Association, which includes the following well-known battery makers, has recently been formed: C. A. Vandervell, Ltd., Peto & Radford, Chloride Electrical Storage Co., Ltd., Fuller Accumulator Co. (1926), Ltd., Joseph Lucas, Ltd., Oldham & Son, Ltd., Rotax, Ltd., and S. Smith & Son (M.A.), Ltd.

The offices of the Association are at 66, Victoria Street, S.W.1, and Mr. F. C. Vine is the secretary.

## I.F.S. Protects Home Battery Production

In Dail Eireann last Friday Mr. Sean MacEntee, Minister for Finance, announced a new import duty of 50 per cent., with a preference rate of 33⅓ per cent, on imported dry batteries and component parts, other than carbon rods, brass caps, and brass sockets of dry batteries. Such imports were previously subject to a flat rate duty of 33⅓ per cent.

At Ballina, County Mayo, the O'Connor Dry Cell Manufacturing Co. is now producing flash lamp batteries, and during this month the factory will begin making dry batteries for radio sets.

## Oil-engine Exhibits

Messrs. Ruston & Hornsby, Ltd., inform us that they will be exhibiting at the Cinematograph Trade Exhibition at the McLellan Galleries, Glasgow (June 19th-23rd); the Highland Show, Dundee (June 20th-23rd); and the Royal Show, Derby (July 4th-8th).

## For Sale

D.c. motors are offered for sale by Plymouth Electricity Department.

Electrical plant is offered for disposal by the Torquay Electricity Committee. (See our classified advertisements.)

## Recent Contracts

Messrs. T. Jones & Co., Liverpool, have received a contract valued at £1,295 for the electric lighting, power and bell installation at the new Liverpool Orphanage, Woolton, Liverpool.

Mr. J. W. Gibson, a British engineer, and the company which he has formed for the purpose, are shortly to begin work on the construction of the great Gebel Awlia dam a few miles south of Khartoum, *Reuter* learns. Mr. Gibson's tender at £E2,078,086 was accepted by the Egyptian Cabinet on May 11th, but final approval was dependent on his forming a company to undertake the work.

## Hospital Cooking Equipment

The Gelligaer Isolation Hospital has recently scrapped its old-fashioned fuel-fired kitchen range and has installed a "Magnet" electrical cooking equipment, manufactured and supplied

**The new "Magnet" cooking installation at the Gelligaer Isolation Hospital**

by the G.E.C. to the specification of the Council's electrical engineer, Mr. Trevor Jones. This equipment is designed to cater for the needs of 130 persons and consists of the following standard units: A "Magnet" double-oven range complete with quick boiling plate, a vegetable boiler, a 12-gal. stockpot, and an 8-gal. urn. With the local cost of energy at ½d. per

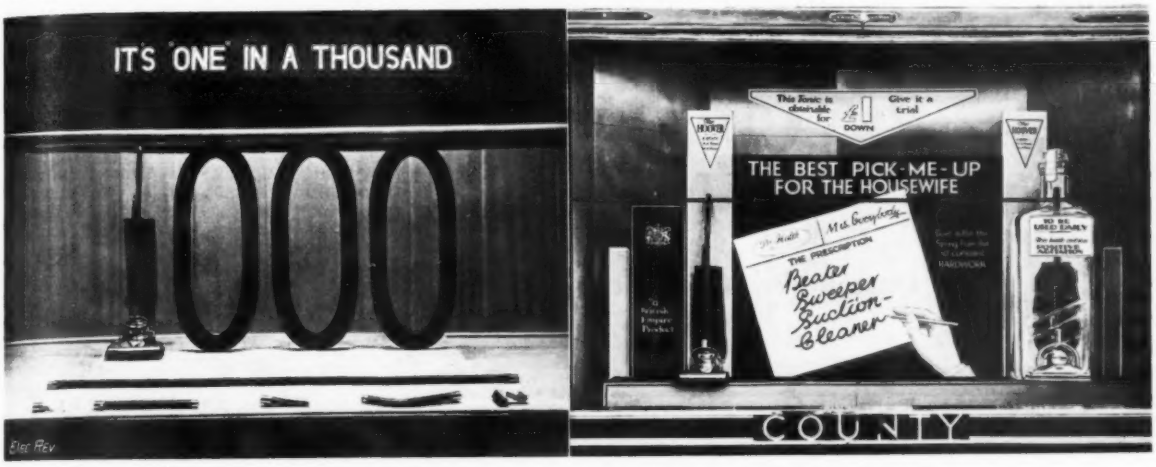
kWh, marked economies in running costs, labour and time are resulting.

### The Swansea Contract

Referring to the article in our issue of May 26th, page 739, outlining the Tir John power station, Swansea, boiler contract, we have been informed that the whole of the specially designed commutator motors operating the forced-draught equipment are being manufactured by the British Thomson-Houston Co., Ltd.

### Hoover Window Display Contest

Hoover, Ltd., announce the result of their window display contest for which were offered a first prize of £25, a second prize of £20, and a third prize of £15, with consolation prizes of £2 each. The winning window was that of the Southport Electricity Department, which has now won the first prize for three years running; two displays were entered, one of which was entitled "It's one in a thousand" and the other "Look before you sweep." The second prize was won by the County of London Electric Supply Co., Ltd., Streatham Branch, whose window was entitled "The best pick-me-up for the housewife." To the third prize of £15 was added a consolation prize of £2, and the sum divided between Messrs. Gardiner, Sons and Co., Ltd., of Bristol, and Messrs. Clark Graham, of Hull. Consolation prizes of £2 each were awarded to the Birmingham Corporation Electricity Department, Messrs. John Barnes and Co., Ltd., Messrs. T. Bridger and Son, Bradford Corporation Electricity Department, and the Leeds Corporation Electricity Department.




**The first and second prize-winning designs in the Hoover window display contest**

### Trade Announcements

The addresses of the Newcastle-on-Tyne and Glasgow depôts of the Fuller Accumulator Co. (1926), Ltd., are now: 2, Eldon Lane, Newcastle-on-Tyne (telephone, Newcastle 25846); and 10, West Campbell Street, Glasgow. The depôts will be in charge of Mr. R. J. Wood and Mr. F. Anderson respectively.

The Curtis Manufacturing Co., Ltd., which has been twenty-three years at Paddington, and whose only address is 26 and 28, Paddenswick Road, Hammersmith, W.6, to which the company recently removed, asks us to state that it is not connected with a firm at Crowborough, Sussex, trading as the Curtiss Manufacturing Co.

### Works Visits

Last Friday about 200 members of the Institution of Mechanical Engineers visited the works of the Grampian Electricity Supply Co., Ltd., in the Rannoch and Tummelbridge areas. Arriving at Pitlochry by special train the party proceeded by motor coach to the company's power station at Bridge of Ericht, on the shores of Loch Rannoch, where the inspection took place under the direction of Mr. George Balfour, M.P. The party also visited the power station in the course of erection in connection with the second section of the company's scheme at Tummelbridge and the dam below Dunalastair. The visitors were entertained to luncheon by Mr. Balfour at Loch Rannoch Hotel, while tea was served at the Tummelbridge canteen.

On May 27th the London Technical Group of the Electrical Power Engineers' Association made a tour of the Clyde Works, Chadwell Heath, of the Metropolitan Electric Cable & Construction Co., Ltd. Before leaving the visitors took tea in the canteen, and Mr. M. J. D. Kerr (director) welcomed them on behalf of the company.

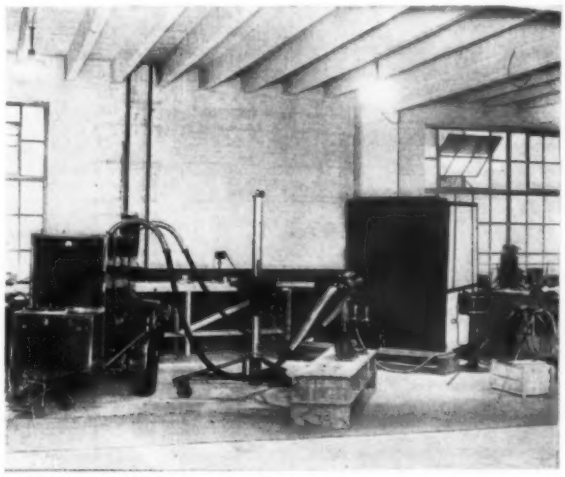
### The Greenwich Industrial Exhibition

The Greenwich Night Pageant, which will reproduce scenes from the lives of famous men and women and historical events connected with the Royal Borough of Greenwich, is to take place between the Wren Buildings of the Royal Naval College from June 16th to 24th, and contemporaneously therewith an Industrial Exhibition is to be held in the near-by gymnasium of the Royal Hospital School. This exhibition will be open daily from 11 a.m. to 9 p.m. and is to illustrate the many industries carried on in the borough. Among the exhibitors will be Messrs. Siemens Bros. & Co., Ltd., who will occupy an island site on which will be staged a representative collection of their manufactures, including cables for telephone and telegraph work, "Neophone" private automatic telephone equipments, and other telephone apparatus, cells and batteries, and the many other products of the company. The Saxonia Electrical Wire Co., Ltd., and Messrs. Johnson & Phillips, Ltd., are also exhibiting a representative display of their products.

The South Metropolitan Electric Light and Power Co., Ltd., in conjunction with the County of London Electric Supply Co., Ltd., has presented the whole of the electrical installation, lighting and effects, in which General Electric Co., Ltd., and the Strand Electric and Engineering Co., Ltd., co-operated, to the Pageant Fund organisers.

### An Industrial Radiographic Service

In these days of welding and fabricated construction X-ray examination is almost essential, but the initial cost of X-ray equipment militates against the practice. Electrical manufacturers and engineers generally will therefore be interested to learn of an industrial radiographic service established by Philips Industrial. This embraces a central laboratory to which specimens can be submitted, and a range of mobile X-ray apparatus, which can be taken to manufacturers' own premises for examinations on site. The scheme provides for examinations to be carried out under a guarantee of secrecy, and advice and quotations for examinations in or out of the factory are given by the company. The scheme has only been made possible by the development of new and improved X-ray equipment which in character is both safe and flexible. The elimination of the high-tension hazard and complete protection against unwanted radiation should do much to bring X-rays into line with other accepted and practical methods of industrial testing.



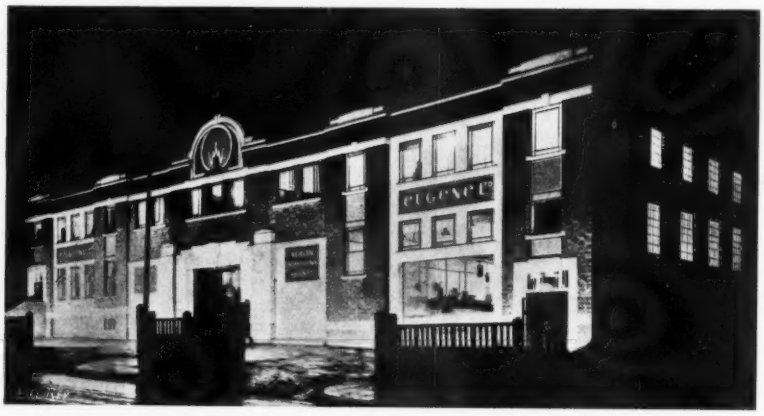
**The Philips X-ray examination laboratory**

### Electric Welding Training in Scotland

The Clyde District Committee of the Boilermakers' Society is to take action regarding the proposal of the National Shipbuilders' Federation to train men in the process of electric welding which is likely to displace a large number of riveters and caulkers in the shipbuilding industry. The Society claims that its members are entitled to preference in welding training

as their trade will be the one most seriously affected by the change-over to electric welding. The Society also contends that electric welding should be classed as a skilled occupation and that its members who are riveters are specially adapted to train for this kind of work. A large number of names have already been registered by the Boilermakers' Society with a view to the applicants being trained.

The Renfrewshire Education Committee is considering proposals by the West of Scotland District Committee of the Boilermakers' Society that classes in electric welding be set up. Unless men were trained in Scotland, it was claimed, it might be necessary for employers to secure the services of electric welders from other areas. The convener of the Committee stated that a course of training in electric welding could not be regarded as educationally satisfactory unless it included instruction in the elements of electricity and metallurgy. It was agreed, however, to consider the matter at a later meeting of the Committee.



**Floodlighting at the factory of Messrs. Eugène, Ltd., Edgware Road, Hendon**

## Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

| CHEMICALS, ETC. | Price. June 7th. | Fortnight's Inc. or Dec. |
|---|---|---|
| *a* Acid, Oxalic ... ... ... ... per cwt. | 50s. | — |
| *a* Ammoniac, Sal ... ... ... per ton | £40 | — |
| *a* Ammonia, Muriate (large crystal) ... ,, | £38 | — |
| *a* Borax ... ... ... ... ... ,, | £17 | — |
| *a* Copper, Sulphate ... ... ... ... ,, | £19 15s. | — |
| *a* Potash, Chlorate ... ... ... per lb. | 3¾d. to 4¼d. | — |
| *a* ,, Perchlorate ... ... ... ,, | 6d. | — |
| *a* Shellac T.N. ... ... ... ... per cwt. | £3 | — |
| *a* Sulphur Commercial ... ... per ton | £11 | — |
| *a* ,, Roll... ... ... ... ,, | £11 | — |
| *a* Soda Chlorate ... ... ... per lb. | 3½d. to 3¾d. | — |
| *a* ,, Crystals... ... ... ... per ton | £5 to £5 5s. | — |
| *a* Sodium Bichromate, casks ... ... per lb. | 4d. | — |
| **METALS, ETC.** | | |
| *b* Aluminium, Ingots ... ... ... per ton | £100 to £105 | — |
| *b* ,, Wire ... ... ... per lb. | 1/1 to 1/9 | — |
| *b* ,, Sheet and Foil ... ,, | 1/2 to 2/9 | — |
| *p* Babbits Metal and Anti-friction Metals— | | |
| Grade I ... ... ... per ton net | £171 | — |
| Grade II ... ... ... ... ,, | £119 | — |
| Grade III ... ... ... ... ,, | £61 | — |
| *c* Brass (rolled metal 2" to 12" basis)... per lb. | 7¼d. | ¼d. inc. |
| *c* ,, Tubes (solid drawn) ... ... ,, | 9¼d. to 9½d. | ¼d. inc. |
| *c* ,, Wire, basis ... ... ... ,, | 7¾d. | ¼d. inc. |
| *c* Copper Tubes (solid drawn)... ... ,, | 10½d. | ¼d. inc. |
| *g* ,, Bars (best selected) ... ... per ton | | |
| *g* ,, Sheet ... ... ... ... ,, | £68 | £3 inc. |
| *g* ,, Rod ... ... ... ... ,, | | |
| *d* ,, (Electrolytic) Bars ... ... ,, | £34 5s. | — |
| *d* ,, ,, Sheets ... ,, | £64 | — |
| *d* ,, ,, Wire Rods ... ,, | £48 | £2 5s. inc. |
| *d* ,, ,, H.C. Wire ... per lb. | 7 $\frac{5}{16}$d. | $\frac{1}{16}$d. inc. |
| *f* Ebonite Rod ... ... ... ... ,, | 1/3 to 1/6 | — |
| *f* ,, Sheet ... ... ... ... ,, | 1/3 to 1/6 | — |
| *n* German Silver Wire ... ... ... ,, | 2/2 | — |
| *h* Gutta-percha, fine ... ... ... ,, | nom. | — |
| *h* India-rubber, Para fine ... ... ,, | 5½d. | ¾d. inc. |
| *i* Iron, Pig. (Cleveland No 3) ... per ton | 62/6 | — |
| *i* ,, Wire, galv. No. 1, P.O. qual. ,, | £20 | — |
| *g* Lead, English Pig ... ... ... ,, | £15 | £1 15s. inc |
| *g* Mercury ... ... ... ... per bot. | £8 17 6 to £9 12 6 | 17/6 inc. |
| *e* Mica (in original cases) small ... per lb. | 6d. to 3/6 | — |
| *e* ,, ,, medium ... ,, | 4/- to 8/- | — |
| *e* ,, ,, large ... ,, | 8/6 to 17/6 & up | — |
| *p* Phosphor Bronze, plain castings ... ,, | 1/1 | — |
| *p* ,, ,, drawn bars & rods ,, | 11d. | — |
| *p* ,, ,, rolled strip & sheet ,, | 10½d. | — |
| *p* ,, ,, wire ... ... ,, | 1/0½d. | — |
| *o* Platinum ... ... ... ... per oz. | £7 15s. | — |
| *d* Silicium Bronze Wire ... ... per lb. | 9d. | $\frac{1}{16}$d. inc. |
| *r* Steel, magnet, in bars ... ... ,, | 7½d. | — |
| *m* Tin, Block (English) ... ... per ton | £216 to £218 | £29 5 inc. |
| *g* ,, Wire, Nos. 1 to 16 ... ... per lb. | 3/2 | — |

Quotations supplied by :—

*a* G. Boor & Co.
*b* The British Aluminium Co., Ltd.
*c* Thos. Bolton & Sons, Ltd.
*d* Frederick Smith & Co.
*e* F. Wiggins & Sons.
*f* India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
*g* James & Shakespeare.
*h* Edward Till & Co.
*i* Bolling & Lowe.
*l* Richard Johnson & Nephew, Ltd.
*n* P. Ormiston & Sons.
*o* Johnson, Matthey & Co.
*p* C. Clifford & Sons, Ltd.
*r* W. F. Dennis & Co.

## A Battery Charging Problem

Mr. R. Wheatley Minter desires to correct a slight error in transcription in his article on page 771 of our June 2nd issue. In the second part of the article the postulated conditions should read . . . "Then 220 V−60=160 V *for* (not 'per') lamp. . . . The charging rate to be 0.2 A (not 'so that the charging rate is')" as of course this is only a condition postulated for the purpose of illustrating the principle.

## Light on Permanent Waves

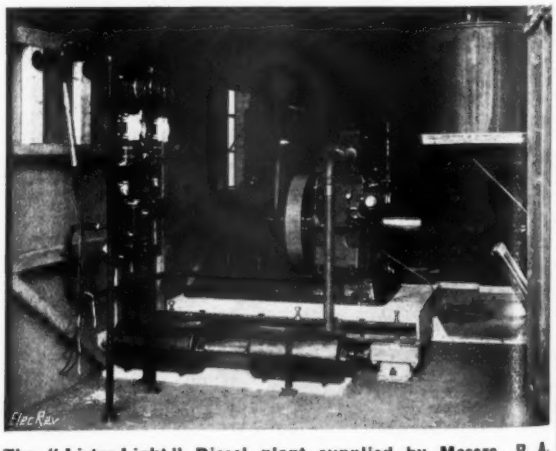
As work is carried on all night at the permanent-wave-apparatus factory of Messrs. Eugène, Ltd., in Edgware Road, Hendon, a first-class lighting installation was considered necessary by the directorate for the very fine work incidental to the manufacture and assembly of much of the apparatus. Also it was considered that the factory should be floodlighted at night for publicity purposes. The installation work was entrusted to Messrs. E. Wight & Co., Muswell Hill, and the satisfactory result of the floodlighting can be seen from our picture. G.E.C. floodlights (model "F.5727") equipped with 1,000-W "Osram" lamps were used, and the installation can be regarded as particularly successful in view of the fact that the brickwork front has an extremely low reflection factor.

## Trade with Jamaica

Mr. H. Massie-Blomfield, Officer-in-Charge of H.M. Trade Commissioner's Office at Kingston, Jamaica, is now in this country on an official visit, and will be available at the offices of the Department of Overseas Trade during the periods June 12th-13th and July 10th-14th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Jamaica, the Bahamas, and British Honduras. Mr. Massie-Blomfield will also visit a number of industrial centres in the Provinces. Firms desiring interviews with Mr. Massie-Blomfield in London, or information regarding his arrangements to visit provincial centres, should apply to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, S.W.1 (quoting reference number 2379/33).

## The Heating of Brighton Schools

It was stated in the report of the General Purposes Committee of the Brighton Corporation for consideration at the meeting of the latter on Thursday last week (June 1st) that Ald. Sir Herbert Carden, a member of the Electricity Committee, had moved the following resolution: "That in view of the urgent necessity of helping the balance of trade it is not desirable to heat the new Whitehawk school with foreign purchased oil, and the Education Committee be requested to report to this Committee (the General Purposes Committee) with alternative methods of heating the school, either with coke, electricity or gas, in order that the Council may decide the matter." This resolution was not carried, and Sir Herbert again raised the question on June 1st, saying that this country was faced with the enormous task of having to pay for a balance of imports over exports, and to increase the imports of oil was unpatriotic. He did not ask the Corporation that afternoon to say how it would heat the school, but he asked it not to use oil. He favoured electricity, although it had not been successful at another school because a wrong kind of ceiling was put in without the recommendation of the engineer. Ceiling heating had proved successful in the showroom. Why not use modern methods and lay cables for the heating supply?



**The "Lister-Light" Diesel plant supplied by Messrs. R. A. Lister & Co., Ltd., for the exhibition train of Messrs. J. S. Fry & Son which is now on a three months' tour of England** (see May 26th issue, p. 751)

He moved the reference back of this item. Ald. Galliers seconded. Councillor Hone (Chairman of the Education Committee) stated that the installation of electricity would cost £650 as estimated, and energy, at ¼d. per kWh, £125 per year. Ald. Kingston (Chairman of the Electricity Committee) said that Brighton had £2,000,000 invested in its undertaking. His Committee would meet the Education Committee in every possible way and leave no stone unturned to keep the heating of the school in the entire control of the Corporation. Ald. Sir Herbert Carden's motion was carried.

## I.E.E. Benevolent Fund Golf

The annual competition for the Dennis Trophy, entrance fees for which go entirely to the above fund, will be played on the Meyrick Park Links, Bournemouth, and will be open from after lunch on Saturday, until 5 p.m., Thursday, June 15th. The entrance fee is 2s. 6d. per card with an optional sweep of 1s. Those who are unable to enter may send their 2s. 6d. (which will be duly acknowledged) to Mr. R. N. Torpy, Golf Secretary, Norfolk Hotel, Bournemouth.

## French Domestic Electrical Apparatus Trade

The appended table shows the French imports and exports of domestic electrical apparatus during last year as compared with 1931.

| | Imports. | | Exports. | |
|---|---|---|---|---|
| | 1931. | 1932. | 1931. | 1932. |
| | 1,000 fr. | | 1,000 fr. | |
| Electric heating stoves and apparatus ... ... | 9,976 | 4,647 | 5,233 | 2,668 |
| Electric irons ... ... | 223 | 244 | 418 | 210 |
| Vacuum cleaners ... ... | 7,435 | 6,051 | | |
| Refrigerating machines ... | 9,605 | 10,185 | 10,470 | 7,055 |
| Electric fans ... ... | 1,439 | 1,001 | | |
| Total fr. ... ... | 28,678,000 | 22,128,000 | 16,121,000 | 9,933,000 |
| Total at 86 francs to the £ | £333,465 | £257,300 | £187,450 | £115,500 |

## New Catalogues and Lists

**Ferranti, Ltd.,** Hollinwood, Lancs.—List No. Wb.513 (price 6d.) dealing with constructional power amplifiers and receivers.

**Sinclair Speakers,** 49/50, Twyford Street, N.1.—A folder illustrating and describing "Sinclair" loud speakers.

**Archibald Low & Sons, Ltd.,** Merkland Works, Partick, Glasgow.—List No. H,W.33, announcing a reduction in the prices of electric water heaters.

**Holophane, Ltd.,** Elverton Street, Vincent Square, S.W.1.—A 64-page illustrated catalogue of electric lighting fittings. The list (No. 500, Section 2) forms part of the Holophane general catalogue.

**Hart Accumulator Co., Ltd.,** Stratford, E.15.—A price list (No. 242) of portable accumulators in glass containers.

**Radiovisor Parent, Ltd.,** 28, Little Russell Street, Holborn, W.C.1.—A brochure on the "Radiovisor" turbidity indicator.

**J. A. Crabtree & Co., Ltd.,** Lincoln Works, Walsall.—An illustrated pamphlet setting out points to be considered by a householder when ordering an electrical installation.

**Saxonia Electrical Wire Co., Ltd.,** Roan Works, Greenwich, S.E.10.—List No. 1633, containing prices of flexible cords, &c.

## Private Arrangement

**W. R. P. Boughton,** wireless dealer, &c., 126, High Street, Scunthorpe, Lincs.—The creditors met recently at Scunthorpe, when a statement of affairs was submitted which showed ranking liabilities of £1,181 and assets totalling £511. After allowing £20 for preferential claims, the net assets were £491, leaving a deficiency of £690. A resolution was passed confirming a deed of assignment executed to Mr. R. Taylor, 150, High Street, Scunthorpe. A committee was also appointed.

## Bankruptcy Proceedings

**I. L. Lawrence,** electrician, 11, Grand Parade, Brighton.—Public examination June 14th at the Court House, Church Street, Brighton.

**G. W. Mitchell,** electrical engineer, 34, Locks Hill, Portslade.—Application for discharge to be heard on July 13th at the Court House, Brighton.

**H. Parker,** wireless dealer, 10, Stratford Street, Nuneaton.—The public examination was held recently at the County Hall, Coventry, when a deficiency of £187 was disclosed. Debtor attributed his failure to depreciation of stock, lack of capital, and bad trade. The hearing was concluded.

**H. Howroyd,** radio dealer, 200, Leeds Road, Eccleshill, Bradford, late Oxford Chambers, Undercliffe, Bradford.—When the public examination of this debtor was held recently at the County Court, Bradford, a deficiency of £349 was disclosed. Debtor attributed his failure to losses on sets sold on hire-purchase terms and reclaimed, general trade depression, and keen competition. The examination was concluded.

**B. Hetherington,** wireless dealer, 4, Broad Carr Terrace, Holywell Green, Halifax.—Receiving order made May 29th on debtor's own petition. First meeting to-day (Friday) at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford. Public examination July 14th at the County Court, Halifax.

**W. Adams** (trading as "Electrovacs"), electrical engineer, 120, Victoria Street, London.—Trustee, Mr. L. H. Hawkins, released May 19th.

**R. Dring,** electrical engineer, 257, Freeman Street, Great Grimsby, and 52, High Street, Cleethorpes.—Trustee, Mr. C. Turner, released May 19th.

**J. D. Drury** (trading as "Mersey Electrics" and "Drury Brothers"), electrical engineer, 64, Brasenose Road, Bootle, near Liverpool.—Last day for receiving proofs for dividend June 21st. Trustee, Mr. C. Semper, National Bank Buildings, Fenwick Street, Liverpool.

## Company Liquidations

**Lighting Efficiency, Ltd.,** Mill Hill.—Under the compulsory liquidation of this company the accounts show liabilities of £4,534, assets £133, and a total deficiency of £8,801 with regard to contributories, the issued capital consisting of 4,400 ordinary shares of £1 each. The Official Receiver (who is acting as liquidator) reports that the company was formed in March, 1930, under the name of Silvex Signs, Ltd., and in the following May acquired for £500 in shares, a patent relating to an improvement in the manufacture of reflecting signs. It was agreed that this business and that of British Contracts Company, Ltd., general electrical works, which owned the sole agency of a German concern for lighting bowls and fittings, should be amalgamated under the name of Lighting Efficiency, Ltd., and the name of the company was changed with the consent of the Board of Trade on July 2nd, 1931. Shortly after the formation of the company a sign known as "Centerlite" was invented and the company appears to have concentrated on its manufacture and sale. It was introduced to the General Electric Co., Ltd., which became the company's sole selling agent for three months, with a view to entering into a definite contract, and the General Electric Co., Ltd., were acting as sole manufacturers and agents up to the date of the winding up order in November, 1932. The failure of the company is attributed to lack of funds, dissension between directors and lack of an efficient selling organisation in the early days of the company.

**J. Holbrook & Tattersall, Ltd.,** electrical engineers and contractors, 6, Cheapside, and 7, Foster Lane, E.C.—Under the compulsory liquidation of this company the accounts show liabilities of £2,160, assets of £419, and a total deficiency of £3,252, with regard to contributories, the issued capital consisting of 1,512 ordinary shares of £1 each. The failure is attributed to losses on contracts caused by unforeseen circumstances.

**Perfection Radio Store, Ltd.**—Winding up voluntarily. Liquidator, Mr. J. W. Westhead, 12, Birley Street, Blackpool.

**H. F. Ball, Ltd.**—Particulars of claims by July 1st to the joint liquidator, Mr. G. E. Titley, of Messrs. Lomax, Clements, Gladstone & Co., 10-13, Newgate Street, E.C.

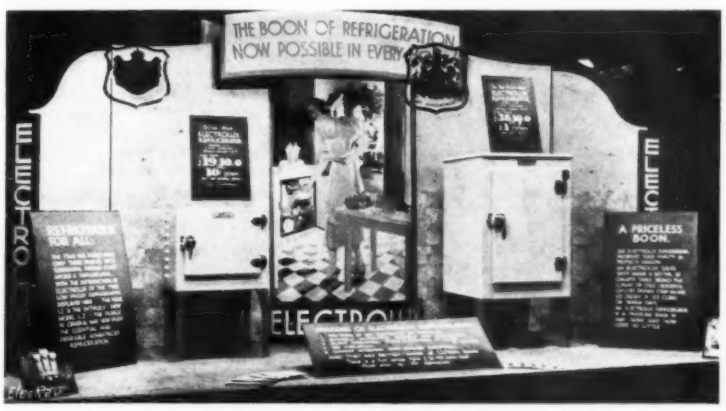
**Diathermic Rays, Ltd.**—Meeting July 5th at Anderton's Hotel, Fleet Street, E.C.4, to hear an account of the winding up by the liquidator, Mr. L. F. Fry.

**Ironside, Son & Co., Ltd.**—Meeting July 3rd at 46, Basinghall Street, E.C.2, to hear an account of the winding up by the liquidator, Mr. M. Lancaster.

**Regent Radio, Ltd.**—Meeting July 5th at the offices of Messrs. Stoy, Hayward & Co., 103, Cannon Street, E.C.4, to hear an account of the winding up by the liquidator, Mr. R. J. Hayward.

**Coley & Swinnerton, Ltd.**—Meeting July 3rd at the offices of Messrs. Richey & Drinkwater, 1, Newhall Street, Birmingham, to hear an account of the winding up by the liquidator, Mr. A. S. Drinkwater.

**Twickenham & Teddington Electric Supply Co., Ltd.**—Meeting July 6th at Broad Sanctuary Chambers, Westminster, S.W.1, to hear an account of the winding up of the company by the liquidator, Mr. G. Bostock.




A summer display by Electrolux, Ltd., in Regent Street, London

**Electromobile, Ltd.**—Meeting July 5th at the offices of Messrs. Starkie & Naylor, Greek Street Chambers, Leeds, to hear an account of the winding up by the liquidator, Mr. R. F. Starkie.

**London Electric Service, Ltd.**—Winding up order made May 29th by the High Court.

**Vernon Smith & Sons, Ltd.**—First meetings June 13th at 33, Carey Street, Lincoln's Inn, W.C.2.

**A. H. Hunt, Ltd.**—Meeting July 3rd at the company's offices, Tunstall Street, Croydon, to hear an account of the winding up by the liquidator, Mr. A. H. Hunt.

## Meetings of Creditors

**G. H. Carter (Eastern Counties), Ltd.**—A meeting of creditors will be held at 2, Coleman Street, London, E.C.2, on June 12th.

**Mur-Ray Signs, Ltd.**—A meeting of creditors was to be held at the company's offices, 11, Ladyburn Road, Fallowfield, Manchester, on Wednesday.

**Neolight Signs Co., Ltd.**—A meeting of creditors was to be held on Wednesday at the company's offices, 11, Ladyburn Road, Fallowfield, Manchester.

**Davis Electrical Co., Ltd.**—A meeting of creditors is to be held to-day (Friday) at the offices of the Electrical Traders' and Importers' Association, 1-3, Oxford Court, Cannon Street, E.C.4.

## Dissolution of Partnership

**G. Trevor** and **G. G. L. Wicks,** radio engineers, 9, Goodmayes Road, Goodmayes.—Mr. Charles Trevor and George Gordon Lindsay Wicks have dissolved partnership.

# Electricity Supply

## Lighting, Domestic, Power

**Accrington.**—MULTI-PART TARIFFS FOR BUSINESS PREMISES.—At a recent meeting of the Chamber of Trade, the president (Mr. J. C. Smith) reported that the National Chamber had adopted a resolution calling for a multi-part electricity tariff similar to that already applied to domestic premises. In a report issued by the Electricity Commissioners the principle of such a tariff was pressed for adoption. An Accrington deputation had been informed that no such tariff was in operation for business premises, and, if adopted, would prove too expensive for the user. A resolution was passed drawing the attention of the Electricity Committee to this report, coupled with a request for its application in Accrington.

EXTENSIONS.—The Corporation Electricity Committee is to extend cables at a cost of £813 to supply the Whinney Hill Plastic Brick Works.

**Airdrie.**—X-RAY APPARATUS.—The Public Health Committee has asked a sub-committee and the medical officer to obtain information as to cost, &c., of installing X-ray apparatus in the hospital.

**Allendale (Northumberland).**—ELECTRIC LIGHTING SCHEME.—The Parish Council is considering a scheme for the North-Eastern Electric Supply Co., Ltd., to light the town at a cost of £993. A final decision is to be left to a public meeting of the inhabitants.

**Australia.**—THE NYMBOIDA SCHEME.—The Clarence River County Council proposes to apply for sanction to loans for the following purposes: Extension of Nymboida power station, £12,000; extension of Lismore power station, £18,000; distribution in Bellingen Shire, £24,000; rural lines, £50,000.

**Barrow-in-Furness.**—CANVASS TO BE TAKEN.—At a recent meeting of the Electricity Committee, the clerk to the Aldingham Parish Council asked if the Corporation would supply electricity to the four villages of Leece, Dendron, Gleaston, and Baycliffe. The electrical engineer reported that he had prepared a provisional estimate of the cost of extending the mains from Scales, and also a further extension to Aldingham, but that before making any recommendations he would have a canvass made and report further.

A SATISFACTORY YEAR.—Despite a loss of revenue of £2,777 from the tramways, as well as a reduction in the receipts from the railway works owing to their being moved from Barrow, the Electricity Department is able to show a gross profit of £44,018 for last year, as against £44,583 in 1931-32. The net profit was £6,232, out of which £1,663 had been provided for capital items, and £2,888 for depreciation of stores. Sales of electricity increased from 20,910,235 kWh to 21,405,003 kWh.

TARIFF ALTERATIONS.—Domestic consumers are to have the option of an "all-in" rate for water heating, to include the supply of the heater and electricity. A charge will be made on the average consumption of the various sizes of heaters at approximately ½d. per kWh, and added to the rental, which is based on 15 per cent. of the cost of the heater. It is also proposed to reduce the fixed charge under the demand rate for over 5 kW from £20 to £15 per kW. The electrical engineer has been asked to report as to whether any further reductions in charges can be made.

MAINS EXTENSIONS.—Mains are to be extended to Cartmel Kirkby, Askam, Backbarrow, Haverthwaite, Coniston, Cascow (Ulverston), and Urswick.

**Bradford.**—A SUCCESSFUL YEAR.—A net profit of £24,712 (against £29,694 in the previous year) was made by the Electricity Department during the twelve months ended March 31st last, despite a reduction in charges reducing revenue by £43,000. Electricity sold reached the record figure of 111,731,772 kWh, an increase of 12,060,187 kWh. New consumers numbered 2,911, bringing the total to 38,894. The total income of the Department was £601,184, a decrease of £22,672, and working expenses were £363,050, an increase of £3,481.

**Broughton (Westmorland).**—NEGOTIATIONS FOR SUPPLIES.—The Parish Council is negotiating for a supply of electricity to the streets of Great and Little Broughton.

**Canada.**—SASKATCHEWAN COMMISSION'S REPORT.—According to the annual report of the Saskatchewan Power Commission for 1932, generating plants operated by the Commission produced 46,426,171 kWh of electrical energy, in addition to which 1,803,503 kWh was purchased for distribution; the corresponding figures for 1931 were 46,040,000 kWh and 1,414,420 kWh. During the year the Commission, with its fourteen generating plants, served three cities and 117 towns and villages operating upwards of 1,321 miles of transmission line. The Commission's fixed assets are reported at $7,345,916, while revenue last year totalled $1,162,023, the operating profit being $132,217. After accounting for interest, depreciation, and replacement reserves, there was a deficit of $50,979, as against $37,006 in 1931. The Fraser-Brace Engineering Co., Montreal, has prepared for the consideration of the Commission a proposal for the establishment of a hydro-electric station on the Saskatchewan River near Fort à la Corne. In 1931 it was estimated that 125,000 h.p. could be developed at this site at a cost of $12,207,135.

**Central England.**—FREQUENCY CHANGES.—Two hundred and thirty large consumers taking h.p. supplies totalling over 180,000 h.p. have been completely changed over from the old frequency of 25 cycles to the standard 50-cycle supply. This has involved the change-over of over 11,000 motors, and in addition generating and converting plant of approximately 200,000 kW has been standardised.

**Cheadle and Gatley.**—NEW SUB-STATION.—The Urban District Council is to erect a sub-station in the Cheadle Road district where a number of all-electric houses are being erected.

**Cheltenham.**—EXTENSIONS.—The Electricity Committee is to extend mains at an estimated cost of £671, and has authorised the electrical engineer to arrange terms with the Birmingham Corporation for a site on the Salterley Grange Estate for a transformer and switchgear in connection with the extension to Blackhedge, Birdlip Road.

**Croft.**—RURAL SUPPLIES.—The North-Eastern Electric Supply Co., Ltd., has refused to supply the villages of Heighington and Brafferton with electricity on the grounds that it is not an economical proposition, and the Rural District Council has decided to communicate with the company with regard to the requests of the parishes of Barton, Cleasby and Stapleton for supplies.

**Darwen.**—ELECTRICITY UNDERTAKING'S RESULTS.—It was stated at a meeting of the Town Council on June 1st that in twelve years a sum of £20,304 had been contributed to the relief of rates by the Electricity Department, including £2,000 this year. Sales of electricity had increased by 4.5 per cent., and there were now 5,691 consumers. The net profit was £3,572, as compared with £3,940 in the previous year.

**Denmark.**—LARGE OIL ENGINE.—What is claimed to be the largest single oil engine yet built, a 22,500-b.h.p. B. & W. two-stroke double-acting set, has been installed in the H. C. Oersted power station at Copenhagen, and is now undergoing trial runs.

**Dewsbury.**—CINEMA SUPPLIES.—The Electricity Committee has reconsidered a recent decision regarding electricity for cinemas, and has now decided to fix a cinema rate of 1¾d. per kWh conditional upon a minimum supply of 110,000 kWh per annum being taken or paid for and subject to no discount allowance being made.

ELECTRICITY FOR MILLS.—A supply of electricity is to be given to the Calder Mills of Messrs. M. Oldroyd & Sons, Ltd., subject to the company's guaranteeing a consumption of the value of at least £500 per annum for three years.

HIRE OF WATER-HEATING APPARATUS.—The electrical engineer has been authorised to arrange for the hiring of electric water-heating apparatus.

**Durham.**—SCHOOL LIGHTING.—The Board of Education has approved a proposal for the installation of electric lighting in the Dean Bank Council School.

**East Grinstead.**—SUPPLY EXTENSIONS.—The Rural District Council has been informed that the Horley District Electricity Supply Co., Ltd., is carrying out negotiations with a view to providing supplies to Copthorne, Crawley Down, and Turner's Hill.

**Exeter.**—INCREASED GENERATING EFFICIENCY.—The city electrical engineer reports that electricity generated during the year ended March 31st last shows an increase of 29.82 per cent. as compared with the previous year. The increase in the cost of coal used, however, amounted only to approximately 9 per cent. Special efforts have been made during the year to improve the station efficiency, and the cost of coal per kWh generated shows a reduction of 16.1 per cent., which is equivalent to a saving of approximately £3,100.

**Folkestone.**—PROMENADE LIGHTING.—A scheme of ornamental lighting for a part of the promenade is being considered by the Town Council.

**Gartmore (Stirlingshire).**—LIGHTING OF VILLAGE.—A meeting of ratepayers has agreed to the formation of a special lighting district. The village was formerly illuminated by petrol lamps, but electric lighting is now to be introduced.

**Gisburn (Lancs).**—INAUGURATION OF ELECTRICITY.—A supply of electricity was switched on recently by Mr. W. Heaton, J.P., a member of the Parish Council. Among those present were representatives of the Clitheroe, Darwen, and Accrington Electricity Committees.

**Grange.**—ELECTRICITY CHARGES.—Negotiations have been in progress between the Urban District Council and the Barrow Corporation on the subject of lower electricity charges. Concessions have been made, but the Grange Council has written to the Corporation explaining it is unable to agree to the heating charge being reduced from 1½d. to 1d. per kWh, as it was anxious to reduce as soon as possible the annual charge based on the rateable value. That was considered to be the best method of inducing more customers to come on to the rateable value scale. Meanwhile, it is interesting to note that the Barrow Electricity Committee has recently reduced the fixed charge under the demand rate for all electricity used over 5 kW from £20 to £15 per kW.

**Grays.**—REVISED CHARGES.—The Urban District Council has revised the two-part tariff for business premises where consumers have a maximum load of over 5 kW in any quarter. The maximum demand charge will be £1 10s. per kW. for 5-10 kW, and £1 5s. per kW beyond.

**Guildford.**—CHANGE-OVER PLANS.—In order to meet the increasingly heavy demands for electricity in certain parts of the town, it will be necessary this year to change over from d.c. to a.c. The work will be carried out during the summer and the estimated cost, including cables, kiosks, transformer, etc., and changing of appliances, will be £7,800.

SUPPLY TO COMPTON PREMISES.—It was reported at a recent meeting of the Electricity Committee that the Mid-Southern Utility Co. could not entertain the Corporation's offer to agree to a Fringe Order for specified premises at Compton on the conditions mentioned, namely:—That the Order should be revocable until the expiration of ten years, and that the Corporation should not be called upon to pay compensation on the revocation of the Order. The company inquired whether the offer now made is to be considered final. It was left in the hands of the chairman, the town clerk and the borough electrical engineer to continue negotiations.

MAINS EXTENSIONS.—Mains extensions costing £3,170 are to be carried out to supply new estates now being developed.

**Harrow.**—CHEAPER ELECTRICITY.—The Harrow Electric Light & Power Co., Ltd., has reduced the lighting flat rate from 4½d. to 4d. per kWh, and the "unit" charge of the alternative two-part tariffs for domestic and business premises from 1d. to ½d.

**Hull.**—SCHOOL LIGHTING.—The Education Committee proposes to spend £1,800 on the installation of electric lighting at schools used as evening play centres.

HEATING OF SUTTON INGS SCHOOL.—Subject to the approval of the Board of Education, electric heating is to be installed at the proposed new elementary school at Sutton Ings.

**India.**—MAYMYO ELECTRIC SCHEME.—The Maymyo hydro-electric scheme was opened in Burma recently by the Governor of the Province, and it is likely to be shortly extended to Mandalay.

**Keighley.**—ELECTRICITY FOR IMMERSION HEATERS.—The Electricity Committee has decided to supply electricity for immersion heaters used for domestic purposes during the summer at ½d. per kWh.

**Kent.**—OVERHEAD LINE EXTENSIONS.—The Kent Electric Power Co., Ltd., is about to extend the overhead line from the sub-station at Gore Court, near Sittingbourne, through Milsted, Doddington, Wychling, Lenham, and on to Sutton Valence.

**Langport.**—OVERHEAD LINES.—The Ministry of Transport has consented to the erection of overhead lines at Langport by the North Somerset Electric Supply Co., Ltd.

**Liverpool.**—THE CLARENCE DOCK STATION.—At a meeting of the Clarence Dock Power Station Committee, the city electrical engineer claimed that the Clarence Dock station, with a thermal efficiency of 25.98 per cent., was the most efficient in the country for the twelve months ended December 31st last. A total of 194,128,380 kWh was generated last year.

**Maidstone.**—EXTENSIONS.—The Town Council is to erect an overhead line to supply twenty-one houses along the Pilgrim's Road at Detling. Mains are also to be laid to the Cock Inn, Boughton, and in Coxheath Road, Coxheath.

**Manchester.**—STREET LIGHTING.—The Highways Committee has given instructions for the electric lighting of streets in the Brownley Green area, Wythenshawe, and various other thoroughfares.

**Northern Ireland.**—EXTENSIONS AT BELFAST.—It is proposed by the Belfast Electricity Committee to apply for sanction to a loan of £37,624 for engineering schemes during the next two years. Applications have been received for supplies from eighty-five residents in Monkstown, forty-eight in Mossley, and negotiations are in hand with the Antrim Electricity Supply Co. for supplying approximately fifty houses in Mossley outside the Corporation's area.

**Plymouth.**—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £1,120.

**Pudsey.**—YEAR'S WORKING.—Last year the Electricity Department made a net profit of £3,015.

**Rawtenstall.**—BAKING SUPPLIES.—The Electricity Committee has agreed upon a special rate for bakeries between the hours of 6.30 p.m. and 7.30 a.m.

**Reigate.**—COOKER INSTALLATIONS.—The Town Council has accepted the offer of local registered contractors to supply cable for connecting hired cookers at £2 for each cooker up to 30 ft., plus 2s. per yard in excess of that length. Contractors are to be allowed 5s. on each order obtained by them for the hire of a cooker. At premises where lighting installations are under the hire-purchase scheme the "unit" charge for cookers is to be ½d. instead of ½d.

**Rochdale.**—YEAR'S WORKING.—Owing to the substitution of buses on certain tramway routes and the reduction of charges to some of the large power consumers the Electricity Department's surplus for the past year (£3,941) is less than half of last year's total. Sales of energy advanced by over 3¾ million kWh as compared with the previous year.

**Rugby.**—MAINS EXTENSIONS.—The Urban District Council is to extend mains in various streets at an estimated cost of £900.

**Shoeburyness.**—REDUCED LIGHTING CHARGES.—The Urban District Council has reduced the charge for electricity for lighting by 1d. per kWh.

**South Africa.**—THE CAPETOWN UNDERTAKING.—The Capetown electricity undertaking has this year made a contribution of £50,000 to the rates, and its surplus of £23,996 has been transferred to the renewal and extension funds.

**Stratford-on-Avon.**—RURAL EXTENSIONS.—The Shropshire, Worcestershire and Staffordshire Electric Power Co. is to carry out an extensive scheme for supplying electricity to many villages in the Stour Valley, and the divisional mains department is now planning routes and obtaining wayleaves.

**Todmorden.**—PRESSURE ALTERATIONS.—A scheme costing £1,800 has been approved providing for the transfer of the Burnley Road section from 3,000 to 10,000 V, with the erection of a transformer at Stansfield Hall.

**The architectural beauty of University College, Swansea, is accentuated by the floodlighting installation recently carried out by the Corporation Electricity Department with Siemens projectors and lamps**

**Tunbridge Wells.**—ELECTRICITY UNDERTAKING'S PROGRESS.—An increase of 1,378 in the number of consumers during the year ended March 31st last is reported by Mr. R. N. Torpy, the borough electrical engineer, this makes a total of 9,032 now connected. Under the hire-purchase wiring scheme, 967 connections were made, bringing the total to 3,252. There was a gross profit of £54,916, and a net profit of £15,688. Electricity sold increased from 18.8 to 21.7 million kWh, of which 9.4 million kWh was given in bulk to the Weald Electricity Supply Co., Ltd., and the Tonbridge Urban District Council.

**Wiltshire.**—INQUIRY INTO ELECTRICITY CHARGES.—Public bodies and trade organisations at Devizes, Chippenham, Trowbridge, Warminster, Bradford-on-Avon, Westbury, and Corsham have jointly considered the charges for electricity in the supply area of the Western Electricity Supply Co., Ltd., and have asked for a public inquiry by the Ministry of Transport.

**Wimbledon.**—NEW DOMESTIC TARIFF.—It is proposed to introduce an alternative domestic tariff, with a quarterly fixed charge based upon the size of the premises supplied, plus a "unit" charge of ½d in the summer and ½d. in the winter. It is estimated that it would be to the benefit of 66 per cent. of the domestic consumers to adopt the new tariff and this would mean a concession by the Corporation of approximately £44,000 per annum.

SUB-STATIONS.—Sanction has been received to a loan of £5,243 for sub-stations and equipment.

# Traction

**Austria.**—RAILWAY ELECTRIFICATION.—In a recent issue of the *E.T.Z.*, Herr Hugo Luithlen deals at some length with the experience gained in connection with the electrified sections of the Austrian State Railways. Only about 390 miles (10 per cent.) of the system has so far been electrified, the principal lines being that between Salzburg and Innsbruck, and the Brenner section, which includes several branches. The power for the lines is supplied from five hydro-electric stations working in parallel. The principal difficulties which have been encountered are the corrosion of the turbine blades and with the windings of some of the generators. The h.p. transmission lines have given but little trouble, and the ferro-concrete line-supporting masts have required only small, easily effected repairs. On the Vorarlberg line iron supporting masts with the upper portions galvanised are still used and have worked well. The conductors of the transmission lines are of copper or of "Aldrey" aluminium alloy; the insulators, notwithstanding a few ruptures due to extreme cold, have not given rise to any serious disturbance. Although the rails are used for the return current, it has not been found necessary to resort to bonding.

**Burnley.**—TRAMWAY ABANDONMENT PROPOSAL.—A report by Ald. W. Buchanan, chairman of the Burnley, Colne and Nelson Joint Transport Committee, upon a proposal to abandon the Nelson-Colne and Nelson-Higherford tramways and substitute buses has been received by the Town Council. In a statement on operating costs, Mr. Stafford (manager) says that it is obvious that the decision lies between petrol buses and trolley vehicles. The advantages of petrol vehicles, he says, are: the necessity for speedy substitution, avoidance of seeking Parliamentary sanction necessary before trolley vehicles could be operated and the narrowness of streets in Colne and Nelson making them unsuitable for the continuance of poles and overhead equipment.

**Darwen.**—YEAR'S WORKING.—The Corporation tramways showed a net profit of £3,824 last year.

**Elgin.**—TRAFFIC SIGNALS.—The erection of traffic control signals at three street junctions is being considered by the Town Council.

**French Colonies.**—PROPOSED ELECTRIC RAILWAYS.—Some time ago the French authorities took up the question of electrifying several railways in their colonies, and also constructing new electric lines. Detailed estimates for the following lines are now before the French Colonial Minister, who will shortly announce his decision:—West Africa, Kayeo-Bamato (364 miles), Konacry-Niger (410 miles), French Congo, Brazzaville-Point Noire (310 miles), Madagascar, Tananarive-Juneck (130 miles), Fianarantsoa-East Coast (101 miles); Reunion (78 miles), Indo-China, Saigon-Mytho, and Hanoi-Santay.

**Germany.**—RAILWAY ELECTRIFICATION.—The German State Railways have decided to electrify the following railways:—Halle - Koethem - Magdeburg, Augsburg - Nuremberg, and Munich-Dachau. *Reuters Trade Service* learns that the work will be started at once

**India.**—DIESEL-ELECTRIC TRACTION.—The Standing Finance Committee for Railways in India has decided to make an experiment in the use of Diesel-electric locomotives for traction on railways, and has sanctioned the purchase of two main-line locomotives of this type. Although it is considered that they cannot replace steam locomotives to a very large extent, these locomotives have a special advantage where there is scarcity of water and where the line is some distance from coal supplies.

TRAFFIC CONTROL EXPERIMENTS IN BOMBAY.—The Traffic Committee appointed by the Government of Bombay has approved the installation of an "Electromatic" traffic control system in Bombay City.

TROLLEY-BUS SERVICE FOR DELHI.—As an experiment it is proposed to run a trolley-bus—the first in India—on a route in Delhi.

**Italy.**—ELECTRIFICATION OF STATE RAILWAYS.—To finance a scheme for electrifying the State Railways which will be undertaken almost immediately a loan of 600,000,000 lire (£9,230,000 at present rates) in 4½ per cent. bonds was issued for public subscription on June 1st. The bonds, which are issued by the Consortium of Credit for Public Works, are redeemable in twenty years. For the first five years after the opening of the loan three annual prizes of 1,000,000 lire (about £15,000) are offered to bondholders, who will also be eligible for a number of free railway tickets available for one month anywhere on the State Railways. Count Ciano, Minister of Communications, states that with the money the Government intends shortly to extend the electrification to 41 per cent. of the system. The first work to be undertaken will be the electrification of the Rome-Florence, Rome-Naples, Naples-Salerno and Meraño-Bolzano-Trento lines.—*Reuter* (Rome).

**Leyton.**—TRAFFIC SIGNALS.—The Ministry of Transport has sanctioned the installation of traffic-actuated control signals at the junction of Lea Bridge Road and Markhouse Road at a cost of £730.

**London.**—RAILWAY ELECTRIFICATION.—The Minister of Transport stated in the House of Commons last week that he understood that the railway companies were still examining, in the light of the conclusions of the Weir Committee, the question of railway electrification. Under the provision of the London Passenger Transport Act the electrification of lines in the London suburban area was a matter which it would be the duty of a Standing Joint Committee of the Railway Companies and the London Passenger Transport Board to consider, and steps had been taken to expedite this consideration.

**Manchester.**—A QUEUE BYLAW.—The City Council has approved a tram and bus bylaw under which passengers will be compelled to queue up at stopping places.

**Middlesex.**—TRAFFIC SIGNALS FOR GREAT WEST ROAD.—The County Council is to install "Electromatic" traffic signals at junctions along the Great West Road and elsewhere in the county.

**South Africa.**—JOHANNESBURG TRANSPORT PROPOSAL.—The Johannesburg City Council has passed a resolution recommending the Tramway and Lighting Committee to consider the appointment of an independent person, or persons, outside the service of the Council, to inquire into the transport system of Johannesburg, and to make such recommendations as are considered necessary.

**South Shields.**—TRAM SPEED-UP.—The Tramways Committee has approved a scheme for speeding-up the tramway service by eliminating a number of stopping places.

**Tees-side.**—LOSS ON RAILLESS TRACTION.—A net loss of £2,838 on the year's working of the Tees-side Railless Traction Board is reported in the accounts issued for the twelve months ended March 31st.

**West Hartlepool.**—YEAR'S WORKING.—The annual report of the Corporation transport undertaking shows a total deficit on both trolley-buses and motor-buses of £504, as compared with £7,811 the previous year. On the trolley-buses there was a gross profit of £7,206 and a deficit of £2,033.

# Communications

**Australia.**—NEW BROADCASTING STATIONS.—Mr. Parkhill, the Australian Postmaster-General, recently stated that there was a surplus of £73,000 for the past two years of broadcasting, due to the suspension of the broadcasting construction programme. Money would be made available for the building of additional stations in the coming year. The Ministry had decided to terminate the agreement for the payment of patent royalties, which now absorbed 3s. of each licence fee, but the change would not take effect for twelve months.

**Great Britain.**—RADIO RELAY EXCHANGES.—The Guildford Corporation Highways Committee is considering an application by British Concessions, Ltd., for permission to operate a rediffusion system in Guildford.

**Hull.**—TELEPHONE COIN BOXES.—The Corporation Telephones Committee has adopted the manager's estimate of the initial demand for multi-coin box service from kiosks in Hull which he puts at approximately 100 trunk calls per week. This service could be catered for by substituting multi-coin boxes in eight of the kiosks. To secure uniformity of working with the existing single-coin box service the post-payment type of multi-coin box was recommended. It has become necessary to install additional switches to carry the increasing traffic at a cost of approximately £600.

**India.**—CALCUTTA-LONDON TELEPHONE SERVICE.—Arrangements are in hand for the inauguration of a telephone service between Calcutta and London, by way of Kirkee, near Bombay, and between Madras and London. It will be possible to telephone from Simla and Delhi to London by July.

TELEPHONE EXTENSION SCHEME.—Considerable extensions to the telephone system are taking place in South India. Recent completions are between Ootacamund, on the west coast, and Coonoor, Kotagiri, Metturalaiyam, and Coimbatore, and to Calicut, Cochin, Ernakulan and Alleppey. Lines are now being installed from Coimbatore to Trichinopoly, and thence to Madras, on the east coast. When this is completed there will be direct communication between Ootacamund and Madras, and within a year the line between Bombay and Madras will be completed. For extensions on the west coast a repeater station with a four-fold amplifying unit is being installed at the Shoranur exchange. Further north the trunk line between Ranchi (in Bihar and Orissa), Patna, Calcutta, and other important places is nearing completion, and will be inaugurated shortly.

**South Africa.**—AUTOMATIC TELEPHONES FOR DURBAN.—The Railway and Harbour authorities have decided to install automatic telephones throughout the Durban area of the Administration. It is expected that there will be a general change in the whole of the Durban area next year, and the decision of the railways is in anticipation of this. The Railway Administration is also to introduce a single carrier-circuit telephone system from Durban to Ladysmith to supplement the present service.

A LONG TELEPHONE LINK.—What is claimed to be the longest telephone line in the world will be opened to the public shortly when the telephone system of the Union of South Africa is linked to that of the Rhodesias. The work of connecting West Nicholson with Beit Bridge by telephone has already been in progress for some months and is nearing completion. The new line will replace the primitive one by which emergency communication has been possible in the past, but which it was impossible to use for the purposes of the general public.—*Reuter* (Bulawayo).

## Single-phase Generator Developments

IN a review of the progress made in connection with synchronous machines during the past year, the Brown Boveri Co., of Baden, Switzerland, mentions that the most interesting development was an order for three single-phase generators for the Altendorf power station of the Etzelwerk Gesellschaft, a company formed jointly by the North-East Switzerland Power Supply Co. and the Swiss Federal Railways. These are said to be the first vertical-shaft single-phase generators coupled to high-head water turbines to be built for an output of 18,000 kVA at 11,000 V, 500 r.p.m., 16⅔ cycles. The machines are designed on the lines of the majority of the vertical-shaft units in Europe, namely, with an upper thrust bearing supported on the top of the spider. The shaft of the generator proper is in two parts. The core laminations of the rotor are bored out and the core is flange-mounted between the two sections of the shaft. The four field-pole cores are dovetailed into the rotor core. On the top of the exciter, which is placed just over the housing of the thrust bearing, is mounted a small self-exciting three-phase auxiliary machine with inner armature. A small induction motor driving the centrifugal regulator of the turbine is supplied from the slip rings of the three-phase auxiliary generator.

# Contract Information

*When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below*

## Contracts Open

**Aberdeen.**—Town Council. Electric lighting work at 258 dwellings on a site to the north of School Road. Mr. A. B. Gardner, director of housing, 11, Broad Street.

**Angus.**—June 21st. County Council. Various works, including electrical installation, at extension of the County Buildings, Forfar. Master of works, Municipal Buildings, Forfar.

**Australia.**—MELBOURNE.—July 24th. Victorian State Electricity Commission. Porcelain insulators for all voltages. (A.Y. 11834.)*

June 19th (postponed from June 7th). City Council. Boiler plant. (G. 12425.)*

**Ayr.**—June 16th. County Council. Electric lamps. County clerk, Ayr.

**Cheadle & Gatley.**—June 16th. Electricity Department. 250-kVA transformer. (June 2nd.)

**Dover.**—June 30th. Corporation. Transformer chambers. (June 2nd.)

**Dumfries.**—June 12th. County Council. Various works, including electric lighting installation, at Nith Bank housing schemes. Master of works, County Buildings, Dumfries.

June 27th. 500-kW rotary converter, transformer and control gear. (See this issue.)

**Dundee.**—June 20th. Corporation. Thermal storage system for Transport Department depôt. (June 2nd.)

**East Lothian.**—June 30th. County Council. Various works, including electric lighting, at housing schemes. County architect, Haddington.

**Egypt.**—CAIRO.—June 17th (not June 27th as previously announced by the D.O.T.). Ministry of the Interior. Electrical distribution network to supply Samallout and Maasaret Samallout. (A. 11780.)*

August 3rd Overhead and underground electrical networks. (A.Y. 11817.)*

**Glasgow.**—June 19th. Corporation. Electrical work at St. Roch's Elementary School extension. Education offices, Bath Street (deposit £1 1s.).

**Govan.**—June 10th. Clyde Navigation Trust. Stores (including electrical). Stores superintendent, 1, Graving Dock, Govan.

**Lanark.**—June 12th. County Council. Various works, including electric lighting, at 150 houses. Mr. P. C. Smith, county housing and town planning engineer, 13, Clydesdale Street, Hamilton.

**London.**—FULHAM.—June 27th. Electricity Department. Power station extensions, including 12,500-kVA turbo-alternator and 66-kV remote-controlled switchgear. (May 19th.)

METROPOLITAN WATER BOARD.—June 16th. General stores, including electric lamps. Chief engineer, 173, Rosebery Avenue, E.C.1.

ISLINGTON.—June 20th. Borough Council. New automatic telephone installation or reconditioning existing system at the Town Hall. (See this issue.)

**Lossiemouth.**—June 13th. Various works, including electrical and heating, in connection with the restoration of the High Church. Messrs. Geo. Bennett Mitchell & Son, architects, 1, West Craibstone Street, Bon-Accord Square, Aberdeen.

**Manchester.**—June 10th. Town Hall Extension Special Committee. Electric lighting fittings, automatic telephone installation, synchronised clocks, wiring, &c., at Manchester Central Library. (May 26th.)

June 13th. Electricity Department. Pilot and telephone cables between Sale and West Didsbury sub-stations. (May 26th.)

**New Zealand.**—WELLINGTON.—July 18th. Posts and Telegraphs Department. Secondary cells. (A.X. 11803.)*

July 5th. 4,250 telephone instrument and switchboard cords. (A.Y. 11812.)*

**Newcastle-on-Tyne.**—City Council. Electric lamps for six months ending December 31st, 1933. Secretary, City Mental Hospital, Gosforth, Newcastle.

**Nottingham.**—June 13th. Mental Hospital and Mental Deficiency Committee. Installation of electric lighting, &c., at Aston Hall. City engineer and surveyor, Guildhall (deposit £2).

June 20th. Electricity Committee. General stores. (See this issue.)

**Reading.**—June 19th. Education Committee. Electric lighting installation and fittings at the Alfred Sutton Central School, Wokingham Road. Borough surveyor (deposit £2 2s.).

**Rhondda.**—June 26th. Two 150-kVA three-phase static transformers. (June 2nd.)

**South Africa.**—JOHANNESBURG.—June 22nd. City Council. Ten miles of 0.4 in. diam. copper trolley wire. (G.X. 12600.)*

June 22nd. Ten miles of weatherproof braided copper conductors. (A.Y. 11830).*

July 15th. 2,000 street lamp fittings (open reflector type) and 1,000 spare holders. (G.X. 12651.)*

July 17th. South African Railways and Harbours. Electric lamps. (A.Y. 11833.)*

July 14th. Rand Water Board. 950-kW steam turbine-driven alternator set and switchgear. (A.Y. 11835.)*

PRETORIA.—June 30th. Government Supplies Board. Three-element high-frequency oscillograph. (A.Y. 11832.)*

PARYS.—June 23rd. Municipal Council. Generating and distribution equipment. (A.X. 11808.)*

**South Shields.**—Town Council. Installation of electricity in 142 houses, Quarry Lane; Mr. J. P. Watson, borough engineer, Town Hall.

**Stranraer.**—June 12th. Committee of Garrick Cottage Hospital. Various works, including electric lighting. Mr. C. D. Smith, secretary, County Buildings, Stranraer (deposit £1).

**Uruguay.**—MONTEVIDEO.—State Electricity Works. Fifty-two 6,000-V, 3-phase, 50-cycle distribution transformers. (A.Y. 11821.)*

July 25th. 17,700 single- and three-phase house service meters. (A.Y. 11822.)*

**Worcester.**—June 12th. Electricity Department. Switchgear. (June 2nd.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed

**Barrow-in-Furness.**—Electricity Committee. Accepted. Renewals for mechanical stoker (£485).—Underfeed Stoker Co., Ltd.

**Birkenhead.**—Electricity Committee. Accepted. Switchgear and mercury vapour rectifier equipment for Stuart Road sub-station (£2,691).—English Electric Co., Ltd.

**Dewsbury.**—Education Committee. Accepted. Wiring extensions to the Technical College and rewiring the existing buildings (£922).—Ward & Co.

**Durham.**—County Education Committee. Recommended. Installation of electricity at Winlaton Council School (£223).—J. Mayo & Co., Ltd. Electric lighting installation at East Stanley Council School.—Stanley U.D.C. Electric lighting installation at Hawthorn Council School (£27).—Devereux, Moodie & Co., Ltd.

**Guildford.**—Baths Committee. Recommended. Relaying equipment at open air baths (£275).—Marconiphone Co., Ltd.

**Hull.**—Telephones Committee. Accepted. Cable (£1,250).—British Insulated Cables, Ltd.

**Leeds.**—Public Assistance Committee. Accepted. Repairing electrical storage battery at Rothwell Institution (£379).—R. F. Winder, Ltd.

Electricity Committee. Accepted. Electric cookers for twelve months.—Simplex Electric Co., Ltd.

Parks Committee. Accepted. Electric lighting and heating installation at Gotts Park Mansion (£144).—S. Dixon & Son, Ltd.

**Manchester.**—Central Purchasing Committee. Incandescent electric lamps.—J. C. White & Co., Ltd.; Sloan Electrical Co., Ltd.; Brown Bros., Ltd.; Downes & Davies; Underwood (Manchester), Ltd.; Drake & Gorham (Wholesale), Ltd.; Samuel Gratrix Jr. & Bro., Ltd.; Baxendale & Co., Ltd.; Hirst, Ibbetson & Taylor, Ltd.; Richard Johnson, Clapham & Morris, Ltd.; Berry's Electric (1928), Ltd.; O'Brien & Hulme; Priestley & Ford; and Falk, Stadelmann & Co., Ltd.

Transport Committee. Accepted.—Cadmium-copper trolley wire.—R. Johnson & Nephew, Ltd.

**Newcastle-on-Tyne.**—City Council. Installation of electric lighting at the Cowgate Junior and Infants' School (£395).—Fletcher Bros.

**Plymouth.**—Watch Committee. Recommended. Traffic signals (£1,482).—Automatic Electric Co., Ltd.

**Sheffield.**—Electric Supply Committee. Accepted. Sub-station switchgear (£3,005).—A. Reyrolle & Co., Ltd.

**Shipley.**—Electricity Committee. Recommended. E.h.p. cable.—Standard Telephones & Cables, Ltd. L.p. cable.—Metropolitan Electric Cable & Construction Co., Ltd.

**Stockport.**—Education Committee. Accepted. Installation of electric lighting at Houldsworth schools (£97).—McClure & Whitfield.

**Stockton-on-Tees.**—Education Committee. Accepted. Electric lighting installation at secondary school (£295).—T. B. Watson & Son, Ltd.

**Tynemouth.**—Town Council. Accepted. Voltage regulator (£385).—Metropolitan-Vickers Electrical Co., Ltd. Transformer.—Bruce Peebles & Co., Ltd. Cable (£772).—Macintosh Cable Co., Ltd.

**Workington.**—Electricity Committee. Accepted. Paper covered lead cable.—Pirelli-General Cable Works, Ltd. Service shells and cast iron boxes.—W. T. Henley's Telegraph Works Co., Ltd., and British Insulated Cables, Ltd. Switches.—General Electric Co., Ltd. Cable.—J. Gledson & Co., Ltd.; Hackbridge Cable Co., Ltd.; British Insulated Cables, Ltd.

## Forthcoming Events

**Incorporated Municipal Electrical Association.**—June 12th-17th. Bournemouth. Annual convention.

**Associated Municipal Electrical Engineers** (*Great Britain and Ireland*).—June 14th. Bournemouth. Annual meeting.

**Overhead Lines Association.**—June 16th-18th. Bristol. Summer meeting.

**Conference Internationale des Grandes Réseaux Electrique.**—June 16th-24th. Paris.

**Municipal Tramways and Transport Association.**—June 21st. Blackpool. Annual conference.

**Institution of Electrical Engineers.**—June 22nd. Natural History Museum, S.W. 8.30 p.m. Conversazione. (*South Midland Students' Section*).—June 17th. Summer outing to R.B.C., Daventry. (*North Midland Centre*).—June 24th and 25th. Buxton. Summer outing.

**World Power Conference.**—June 28th-July 4th. Stockholm.

**Electrical Contractors' Association.**—July 5th-7th. Torquay. Annual conference.

# Notes

## Fulham Generating Station

The Fulham generating station now in course of construction will occupy a site area of approximately ten acres on the north bank of the River Thames in proximity to, and on the down-stream side of, the Wandsworth Bridge. The river frontage is more than 1,000 ft., whilst the mean depth of the site is about 560 ft. There being no rail connection to the site, the whole of the coal will be water-borne, and a jetty will be built at which 2,000-ton colliers can be efficiently discharged. Coal-storing and reclaiming facilities will be carried out through belt conveyors.

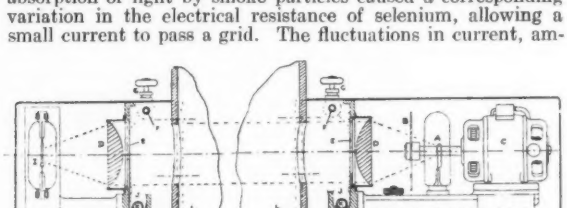
The steam raising plant for the first 130,000 kW will consist of six Stirling high-duty tri-drum type boilers, fitted with multiple-retort type stokers, superheaters having temperature control, Bailey water walls, economisers, air heaters, forced- and induced-draught plant and other auxiliaries. Steam conditions will be 625 lb. per sq. in., 850 deg. F. Gas washing plant for sulphur extraction will be installed. The generating plant for the first section includes two 60,000-kW main turbo-alternators and one 10,000-kW house turbo-alternator. Each of the main sets consists of a horizontal two-cylinder 1,500-r.p.m. steam turbine with a single condenser direct coupled to a three-phase 11-kV, 50-cycle alternator and an exciter. Each alternator will be tied direct to the main 11/66-kV transformers and paralleled on the 66-kV side. The 66-kV metal-clad switchgear will be sectionalised, each section comprising equipment for one generator, feeders, and reactors in a separate housing.

The circulating-water intake and outfall works included in the first section programme will suffice the needs of the completed scheme.

Amongst the contracts already let are those for excavation and foundation work, boiler plant, generating plant, condensers, cranes and steelwork for buildings. There is a picture of the station as it will appear when completed on page 815.

## Smoke Detection

In a lecture to the Sanitary Inspectors' Association (London Centre) last week Mr. A. Tyler gave a brief account of the methods generally employed for detecting undue smoke emission. He considered these unfair both to inspectors and to factory owners. They depended too much on the human element, and could not be used at night; also, any method based upon a scale of shades was unreliable. Mr. H. M. Ford (Automatic Light Control, Ltd.) described the latest developments of the selenium-bridge method of smoke detection. The absorption of light by smoke particles caused a corresponding variation in the electrical resistance of selenium, allowing a small current to pass a grid. The fluctuations in current, amplified by a thermionic valve and rectifier, were used to operate a robust double-pivoted moving-coil indicator, a recording milliammeter, and an alarm lamp. The value of the current with no smoke in the stack was 5 mA. The indications were independent of irregularities of the supply pressure within 10 V, and also of temperature and climatic conditions. A source of light was mounted on the wall of the stack and its beam periodically interrupted by a revolving shutter driven by a small motor. The beam focused through a small aperture in the stack wall and after passing through the path of the smoke in the stack emerged through an aperture in the opposite wall and was there picked up by the selenium bridge. Deposits of soot on the light source bridge were prevented by a film of water in front of a small protecting window.




**Schematic diagram of stack fittings**

A. Light source. B. Interrupter disc. C. Driving motor. D. Condenser lens. E. Window. F. Spray tube. G. Regulator valve. H. Adjustable holder. I. Selenium cell. J. Trough. K. Outlet pipe. L. Stack wall

## A Welding School

It is interesting to note that Murex Welding Processes, Ltd., has recently established a school for imparting the technique of welding. The school caters for all engaged in the welding industry, and three courses provide intensive training for the operator, supervisor, and the designer respectively.

The operators' course lasts two weeks, during which time each student receives expert individual instruction upon which to build future experience. Instructions and practice in making beads of weld metal, vee-butt welds, and outside corner welds, and in pad welding, butt welding overhead, overhead fillet and corner welding, and in speed welding are only a few of the items in the curriculum. At the end of each week test pieces are prepared and welded by the students and tested for tensile strength, &c., in their presence.

The supervisors' and designers' courses occupy three weeks and embrace the operators' course. The third week of the supervisors' course provides instruction in quantitative data, high-speed welding, more advanced overhead welding, and lectures on electricity as applied to welding and metallurgy.

The special part of the designer's course is arranged to enable students to apply their existing knowledge of constructive design to welding technique, and it embraces such lectures and demonstrations as the evolution of welding, strengths of different types of welds, the application of welding to structures, carbon steels, estimating quantities and costs, and special steels and non-ferrous metals. Photographs of students under instruction are reproduced on page 819.

## Electrical Regulations in France

A draft series of standard regulations in respect of installations of (1) luminous tubes and (2) electro-medical appliances have recently been drawn up by a special committee of the French Union des Syndicats de l'Electricité. Before being definitely adopted by the Union, the regulations are being submitted to electrical traders throughout France from whom any suggested modifications are being invited.

## The World Power Conference

Bulletin No. 5 of the World Power Conference contains a full list of the reports to be presented at the Scandinavian meeting which opens on June 26th—and further information regarding tours to places of technical interest. The organising committee will accept for publication brief written communications not exceeding 7,000 types (letters, signs or spaces) as advance contributions to the discussions. Further information may be obtained from the British National Committee, World Power Conference, 63, Lincoln's Inn Fields, W.C.2.

## Technical Education

In his presidential address to the Whitsuntide annual conference of the Association of Teachers in Technical Institutions at Lincoln Mr. F. H. Reid pointed out that during the past ten years courses of instruction leading to the award of National Certificates had been developed, but in many districts of this country there had not been provided such good facilities for the training of the individual who must "produce the actual goods," and for those who would ultimately become shop foremen, &c. The time was ripe for the development of "production courses" for all industries. In order to do this effectively college workshops and workshop laboratories must be equipped with up-to-date machinery and apparatus. If technical education was to play its part, technical teachers must realise still more that their work touched all points of the social, educational, industrial and commercial fields. They had to deal with the problem of unemployment for which science and technology would be increasingly responsible; with the problem of levelling the efficiency of distribution and production; with the problems raised by Continental countries which were using technical education as a weapon in international competition; and with the whole vast question of preparing students to take their place in a world changing with marvellous rapidity.

## Educational

Applications will be received up to August 15th from candidates for the Thomas Charles Turton Memorial Scholarship in electrical engineering at the University of Liverpool Faculty of Engineering.

(See our classified advertisements.)

## Large Mercury Rectifiers for Russia

The Brown-Boveri Co., of Baden, Switzerland, is at present building four rectifier sets for two big works in Russia—Tscheljabinsk and Wladikawkaz—which are being erected to produce zinc electrolytically. The rectifiers will have controlled grids and are intended to supply the zinc electrolytic cells. They form pairs, each of 5,175 kW at 9,000 A and 475-575 V. Each set is combined with a special auto-transformer, which not only regulates the d.c. voltage, but also permits of compensating voltage adjustments on the primary side within a range of plus or minus 5 per cent. On the high-voltage side, each set is to be equipped with a three-pole motor-operated oil circuit breaker and an over-current relay. The step switch on the auto-transformer gives sixty steps, and is to be remote-driven from the switchboard. On the d.c. side, each rectifier will be protected by a high-speed breaker.

## I.E.E. Students' Tour

It is proposed to hold the summer meeting of the London Students' and Graduates' Section of the Institution of Electrical Engineers in Holland and Western Germany. An attractive itinerary, including numerous works visits, has been arranged. The tour will last from July 23rd to August 1st, and applications must be made before June 15th to Mr. R. C. W. Joyce, 14, Moresby Avenue, Tolworth, Surbiton, who will supply further information.

## Appointment Vacant

Assistant lecturer in electrical engineering for Manchester Municipal College of Technology.

(See our classified advertisements.)

# Makers' Names Wanted

Electrically driven aerators for aquariums.

EDOLITE lamps.

Illuminated garden decorations, such as small animals, with lamps inside.

# Our Personal Column

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements**

**Birthday Honours.**—In the list of honours awarded on the occasion of His Majesty's birthday last week a peerage is conferred upon Sir Edward Iliffe, C.B.E., who is chairman of the Electrical Review, Ltd. He is a past-president of the Associated Chambers of Commerce, and during the war was Deputy Controller, and afterwards Controller, of the Machine Tool Department of the Ministry of Munitions. He represented the Tamworth Division of Warwickshire as a Conservative from 1923 to 1929, when he resigned. For many years he was chairman of the Coventry and Warwickshire Hospital, taking an active part in its administration. The principal business interests of Sir Edward Iliffe have been in connection with publishing and insurance. Iliffe & Sons Ltd. are well known in connection with a large number of technical periodicals, while Sir Edward is associated with Lord Camrose and Sir Gomer Berry in many other newspaper enterprises.

**Sir Edward Iliffe, chairman of the Electrical Review, Ltd., upon whom a peerage has been conferred**

Mr. H. P. Thomas, Chief Engineer, Hydro-Electric Department, Punjab, and Mr. R. S. Purssell, O.B.E., Deputy Director-General of Posts and Telegraphs, India, are made Commanders of the Order of the Indian Empire. Mr. J. Hedley, M.I.E.E., Staff Engineer, G.P.O., is made a Companion of the Imperial Service Order. Mr. J. S. Pitkeathly, C.M.G., etc., Chief Controller of Stores, Indian Stores Department, is knighted. Mr. F. W. Field, Senior Trade Commissioner in Canada and Newfoundland, receives the C.M.G. The M.B.E. (Civil Division) is bestowed on Mr. E. L. Clair, Superintendent Higher Grade, Central Telegraph Office, G.P.O.; Mr. J. W. Golsby, Senior Intelligence Officer, Department of Overseas Trade; Mr. W. J. Hodgetts, Assistant Engineer, General Post Office; and Miss Edith Nurse, Chief Supervisor, London Telephone Service.

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**Mr. J. W. Blakemore,** whose appointment as general manager of the Salford Corporation Transport Department was briefly announced in our last issue, is a native of Staffordshire, and went to Salford in 1882. He left school at the age of ten and obtained employment as a parcels boy with the old Manchester Carriage Co., the predecessor of the present transport undertaking. In 1895 he became a junior clerk, and when the Carriage Co. was taken over by the Salford Corporation in 1901 he was transferred with other employés, and in 1905 became senior traffic clerk. In December, 1913, he was appointed traffic superintendent (outdoor), and when the late Mr. Moffett joined the department as general manager in 1923, he was appointed deputy general manager. Mr. Blakemore has played a prominent part in the growth of the undertaking, which during the past year carried 64,984,204 passengers and had a revenue of £366,437.

**Mr. A. J. Cunningham,** a director of Messrs. Cunningham, Beard & Co., Ltd., was injured in a motor collision on June 6th, but we are glad to hear that he is progressing favourably.

**Mr. F. W. Alexander,** a graduate of University College, Dundee, has received an appointment with the British Broadcasting Corporation Science Research Department in London. Mr. Alexander took the degree of B.Sc. with first-class honours in physics at University College, and for the last three years has been carrying out research work under Professor Peddie. In his new post Mr. Alexander will be concerned with acoustics and electrical sound reproduction.

**Sir Alfred Ewing** was presented with the freedom of Dundee, his native city, on May 31st.

**Col. A. G. C. Dawnay,** C.B.E., D.S.O., M.A., has been appointed Controller, Outdoor Division, to the British Broadcasting Corporation. This is a new post and certain adjustments have been made in the organisation owing to the increasing work and responsibilities of the B.B.C. These measures will effect a better co-ordination of responsibility and will enable a clearer definition to be made between the control of the Corporation's output and the services of its administration.

**Mrs. Brayshaw,** superintendent of the girls employed at the Guiseley works of Messrs. Crompton Parkinson, Ltd., has resigned her position. To mark the occasion all the girls took tea with Mrs. Brayshaw, and later a presentation was made at the Guiseley Town Hall.

**Mr. W. G. Brewer,** of the staff of the Burnham-on-Sea and District Electric Supply Co., Ltd., who was recently married to Miss C. P. Whitelock, was presented by the directors and his colleagues with an electric clock.

**Mr. A. P. M. Fleming,** of Manchester, will be the principal speaker on "Industrial Developments of the Century" at the annual summer convention of the American Institute of Electrical Engineers (Chicago, June 26th-30th), under the auspices of the American Association for the Advancement of Science.

**Prof. d'Arsonval.**—The French scientific world gathered together on May 27th in Paris to celebrate the completion by Prof. d'Arsonval, whose contributions to scientific and technical knowledge are known throughout the world, of his sixty years' connection with the Paris University. The gathering was honoured by the French President, and the speakers, all of whom paid tribute to the great scientist, who is now eighty-two years of age, included M. Leonce Armbruster, President of the Renaissance Française; M. Joseph Bedier, of the Academie Française; M. Langevin, of the Collège de France; and M. Georges Claude, of the Academie des Sciences.

**Mr. L. J. Robey,** a member of the head office staff of Messrs. Crompton Parkinson, Ltd., and formerly of the Chelmsford staff, was married on May 27th, at Guiseley, near Leeds, to Miss F. M. Eastburn, of Farnhill, Guiseley.

**The Ayrshire Electricity Board.**—At the annual meeting of the Board held last Friday, ex-Bailie David Orr was re-appointed chairman, and Bailie Ritchie Scott, Irvine, vice-chairman. Bailie James M. Bryce and Bailie Thomas Murray were re-elected as conveners of the Engineering and Finance Committees respectively. The Ayrshire County Council at its last meeting appointed the following as its representatives on the Board: Bailie Hopperton, Ardrossan; Bailie Scott, Irvine; Mr. R. Smith, Kilwinning; and Col. Kennedy, Maybole.

**Col. Sydney E. Smith,** C.B.E., general manager of the Bristol Tramways & Carriage Co., Ltd., has been elected chairman of the Council of the Tramways, Light Railways and Transport Association for the ensuing three years in succession to Mr. E. H. Edwardes.

**Sir Malcolm Fraser, Bt.,** has been elected deputy-chairman of Callender's Share & Investment Trust, Ltd.

**Mr. H. C. Babb,** general manager of the Lothian Electric Power Co. and the Musselburgh and District Electric Light & Traction Co., Ltd., and **Mr. Robert Taylor,** Dundee transport manager, were elected president and vice-president respectively for the ensuing year at the annual general meeting of the Scottish Tramways & Transport Association held recently.

## Obituary

**Mr. G. T. Crocker.**—Mr. George Thomas Crocker, who died at Bristol on June 4th, was for forty years resident engineer to the Bristol Tramways & Carriage Co., Ltd.

**Mr. W. C. Davey.**—Mr. William Charles Davey, senior, whose death was announced in our last issue, was well known in the electrical world, and in 1922 a note appeared in the ELECTRICAL REVIEW recording his fifty years' of service with the late firm of Strode & Co., St. Paul's Churchyard. In 1924 he joined his son in his business, W. C. Davey & Co., telephone and electrical engineers, retiring last November. In addition he had many other interests, having been a member of the Hackney Borough Council for the last fifteen years, and chairman of the Corporation Electricity Committee for the year 1925-1926.

**The late Mr. W. C. Davey**

**Mr. A. Eddington.**—The death occurred suddenly on May 30th, at the age of fifty-five, of Mr. Alfred Eddington, who from 1906 until 1924 was engaged with Marconi's Wireless Telegraph Co., Ltd., at Chelmsford. He joined the staff in 1906, and subsequently became assistant works manager, a position which he retained until 1924. He was a former member of the Town Council.

**Mr. A. J. Dew.**—The death occurred on May 30th, at the age of seventy-three, of Mr. Arthur Joseph Dew, who for nearly fifty years was electrician at Peterhouse, Cambridge. For ten years he occupied the position of engineering instructor at Leys School.

# Financial Section

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares**

## New Companies Registered

**Voigt Patents, Ltd.**—Private company. Registered May 31st. Capital, £1,000 in £1 shares. Objects: To acquire from Paul G. A. H. Voigt a licence under certain letters patent now standing in his name, and to carry on the business of manufacturers of and dealers in apparatus, machinery, records and other articles and parts thereof relating to sound recording, transmission, reception, distribution, &c. The directors are: P. G. A. H. Voigt (permanent governing director) and Mrs. Ida F. Voigt, Spring Grove House, 53, Church Road, Upper Norwood, S.E.19 (both directors of Holyrood Mfg. Co., Ltd.). Registered office: 22, Castle Street, Falcon Square, E.C.1.

**Jewel Battery Co., Ltd.**—Private company. Registered May 29th. Capital, £5,000 in 2,500 ordinary and 2,500 5 per cent. non-cumulative preference shares of £1 each. Objects: To carry on the business of electrical engineers, manufacturers of and dealers in accumulators and batteries and their parts and elements, electricians, &c. The directors are: C. Dunkley, 31, Shandos Road, Harrow, Middlesex; T. L. Bullock, 59, Island Road, Handsworth, Birmingham; and A. Eyre, The Warrender Hotel, Tavistock Square, W.C.1. Secretary: J. Davie. Registered office: Room 3, 7, Lincoln's Inn Fields, W.C.2.

**Gaelite Signs, Ltd.**—Private company. Registered in Dublin May 30th. Capital, £2,000 in £1 shares. Objects: To manufacture, purchase, hire, procure, or to hire-purchase all classes of neon signs, and electrical goods. The directors are: Frederick M. Summerfield, "Cuil-na-Greine," Sutton, Co. Dublin; Robert B. Kennett, 30, Bushy Park Road, Dublin; and J. C. Moorkens, 75, Morehampton Road, Dublin.

**Elgee Manufacturing Co., Ltd.**—Private company. Registered June 1st. Capital, £200 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric panel fittings and shades, makers of electrical appliances, radio and wireless installations, &c. The directors are: Lewis Troshinsky (chairman), 32, Lea Bridge Road, E.; and Michael Green, 47, George Road, E.4. Secretary: Michael Green. Registered office: Eagle Works, George Road, Chingford Mount, London, E.4.

**Sydney Truscott, Ltd.**—Private company. Registered June 1st. Capital, £3,005 in 3,000 5 per cent. cumulative preference shares of £1 each and 100 ordinary shares of 1s. each. Objects: To carry on the business of electricians, mechanical engineers, &c. The subscribers are: George A. R. Richardson, 493, Oxford Street, W.1, clerk; and Ernest J. White, 21, Rockleigh Avenue, Leigh-on-Sea, clerk. Solicitors: Wild, Collins & Crosse, Kennan's House, Crown Court, Cheapside, E.C.2.

**Enfield Zinc Products, Ltd.**—Private company. Registered June 1st. Capital, £6,000 in £1 shares. Objects: To carry on the business of ironfounders, manufacturers of and dealers in electrical batteries, storage cells, accumulators and parts thereof, &c. The subscribers (each with one share) are: Elizabeth Watt and David L. Pollock, 31, Old Jewry, E.C.2, solicitors. Solicitors: Freshfields Leese & Munns, 31, Old Jewry, London, E.C.2.

**Westradio, Ltd.**—Private company. Registered June 1st. Capital, £4,000 in £1 shares. Objects: To carry on business as dealers in wireless sets and apparatus, gramophones and other sound producing and musical instruments, motor cycles and cars, electrical, magnetic and galvanic apparatus and equipment, &c. The first directors are: E. M. Crease, 143a, Whiteladies Road, Bristol; George E. A. Crook, 549, Kingston Road, West Wimbledon, S.W.2.

## Returns of Electrical Companies

**St. Mary's (Scilly) Electricity Supply Co., Ltd.**—Capital, £15,000 in £1 shares (increased from £5,000 in February, 1933). Return dated January 14th, 1933. 4,700 shares taken up. £3,400 paid (being £1 per share on 2,400 and 10s. per share on 2,000 shares), £300 considered as paid on 300 shares. Mortgages and charges: Debenture on all company's assets to Barclay's Bank, Ltd., to secure overdraft of £1,000. Returns of allotments, made up to April 6th, 1933, show a further 3,442 shares allotted, payable in cash, and fully called up.

**Southern Areas Electric Corporation, Ltd.**—The nominal capital has been increased by the addition of £80,000 in £1 ordinary shares beyond the registered capital of £170,000. On May 12th, 1933, 169,993 shares were allotted as fully paid as consideration for the acquisition from W. H. Botsford & Co., Ltd., of 122,200 fully paid shares of £1 each in the Sussex Electricity Supply Co., Ltd.

**Midland Electric Radio, Ltd.**—Debenture dated May 8th, 1933, to secure £250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: J. Whitehouse, Wartell House, Wellington Road, Dudley.

**Electric Zinc Co., Ltd.**—Capital, £2,000,000 in 400,000 preference and 1,600,000 ordinary shares of £1. Return dated December 31st, 1932. Seven ordinary shares taken up. £7 paid. Mortgages and charges, nil.

**Money Hicks, Ltd.**—Particulars filed of £400 debentures authorised April 22nd, 1933, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £100.

**A. W. H. Sound Reproducing Co., Ltd.**—Satisfaction to the extent of £5,500 on May 6th, of debenture dated December 8th, 1931, and registered December 12th, 1931.

**Modern Radio, Ltd.** (old company).—T. Revell, Standard Buildings, City Square, Leeds, ceased to act as receiver and manager on September 11th, 1932. (Notice filed May 27th.)

**L. Benn & Co., Ltd.**—L. Civval, 36, Camomile Street, E.C.2, was appointed receiver and manager on May 24th, under powers contained in debenture dated February 25th, 1931.

**Radio By-Wire, Ltd.**—Mortgage dated May 23rd, to secure £290, charged on 49, Westfield Road, Leeds. Holders: Leeds Permanent Building Society.

**Switchit Service, Ltd.**—Debenture dated May 13th, to secure £250, charged on the company's property, present and future, including uncalled capital. Holder: J. W. Holloway, 81, St. George's Road, Brighton.

## City Notes

**The Central Electricity Board** is to offer for subscription to-day (Friday) an issue of £8,000,000 of 3½ per cent. stock 1963-1993 at £93 10s. per cent. The new stock will rank *pari passu* with the Board's five previous issues, and the proceeds will be devoted to the construction and acquisition of main transmission lines and frequency standardisation, and will provide further working capital.

**The Ever Ready Co. (Great Britain), Ltd.,** held its annual meeting on May 31st, Mr. Magnus Goodfellow (chairman and managing director) presiding. In presenting the report and accounts (ELEC. REV., May 12th, page 689), the chairman said that although foreign competition ceased a year ago, consequent upon the abandonment of the gold standard and the imposition of a tariff, several foreign manufacturers set up small manufacturing plants in this country. They therefore found themselves faced by an increase in home competition, and it was satisfactory that they had achieved so large an increase as 24 per cent. in their sales. Illustrating the effects of their own price reductions to the public and of competition during the past two years, the chairman said that the production and sale, expressed in units for the year under review, was more than double the production and sale of the year ended March 31st, 1931, whereas their profits only rose from £306,000 to £343,000. It was frequently stated that a duty imposed on any trade would be passed on to the consumer by increases in prices. It was of great benefit to their business that their prices were in many cases lower and in no case higher than before the imposition of the import duty of 20 per cent. In the autumn of 1932 the directors finally decided upon the programme of development of a new process. While certain beneficial changes in formulæ would be made, they anticipated obtaining most benefit by a great advance in the mechanisation of manufacture, which should be followed by an important reduction in costs. This change would probably take two or three years to complete, but during the current year they expected considerable benefits from the first manufacturing unit laid down. Raw materials, which in the past had sustained minor manufacturing processes before being received by the company, were now handled by them in their raw state, and in a number of other ways they were seeking to improve their manufacturing position and broaden the basis of their business. The liquid resources of the company were strong, and would in due course be increased by the repayment of capital on its holding in the Ever Ready Trust. Regarding their investment in Lissen, Ltd., the net profit for 1932 was £174,000. Sales from January 1st last again showed a substantial increase, and the outlook was encouraging. Their own sales for April showed a small decrease, a substantial part of which was recovered in May. They could not anticipate a continuance of so large an increase in sales as they had been able to show in the past few years. Their efforts were now being directed to consolidating the position that they had achieved, and he looked forward to normal increases from year to year, brought about by the natural rise in consumption in the present uses of their products.

**Callender's Cable & Construction Co., Ltd.,** reports a balance of £277,773 to the credit of profit and loss account for the year ended December 31st last, as compared with £274,660 for 1931. After meeting depreciation, debenture interest, and preference dividends and adding £292,054 brought forward, the available balance is £460,332. The ordinary dividend is maintained at 15 per cent. and £292,932 is carried forward. The report mentions that the balance of the profit and loss account is arrived at after transferring £160,000 from the renewals and contingencies account. At the last general meeting it was pointed out that certain renewals and replacements in connection with the pioneering work of very high-pressure cables would require to be provided for, and a sum of £200,000 was considered to be necessary. Not more than £160,000 has been required, however, and therefore there remains a balance of £40,000 in that account. Bearing in mind the world-wide financial embarrassments and the difficulties which have occurred throughout the whole period, the results may be regarded as satisfactory. During the year the company disposed of its holding in the Weald Electricity Supply Co., Ltd., taking in exchange therefor shares in the County of London Electric Supply Co., Ltd. The surplus in value secured by this exchange has not been taken into account in calculating the profits for the year. Important contracts for overhead work have been carried through for the Central Electricity Board, one of which included the 132,000-V line crossing the River Thames at Dagenham and the erection of two towers whose height is each about 478 ft. Other important work of a similar character was carried out in the south-west of England. The plant at the Erith works has been maintained out of revenue in a high state of efficiency. New plant has been installed enabling the company to meet the special requirements for the manufacture of cables for the higher working pressures and the results obtained are thoroughly satis-

factory. As a consequence, further contracts for high-pressure cables have been secured. The new research department at Wood Lane is now nearing completion, and when finished the company will possess one of the best research establishments for cable work in the world.

The overseas and Indian business continues, although on a somewhat reduced scale, but in view of all the circumstances, the results have been encouraging. In India, the Uhl River power transmission scheme in the Punjab, for which the company carried out all the distribution equipment, extending over a length of approximately 150 miles, was opened by the Viceroy of India this year. Sir Malcolm Fraser, Bt., G.B.E., represented the company at that function. During his tour he visited other branches of the company's business in India, and this is expected to prove of material advantage to the company. The business of the Anchor Cable Co., Ltd., has suffered from the prevalent depression, but it has maintained its dividend at 20 per cent. The directors have marked their appreciation of the long and valued services of Mr. P. V. Hunter, C.B.E., and Mr. C. Pipkin, by appointing them advisory directors under Article 85. The terms of this article are being submitted for amendment at an extraordinary general meeting. At present the appointments are restricted to the permanent staff of the company, but it may be desirable under exceptional circumstances to appoint other persons who may be otherwise engaged upon the company's business, and the proposed amendment provides the necessary authority. The annual meeting takes place on June 15th.

**Whitehall Electric Investments, Ltd.,** reports a net revenue of £343,628 for the year ended March 31st, this being £34,455 lower than the preceding year's figure. A sum of £159,009 (against £118,426) was brought forward, making a total of £502.637 (£496.509) available. After providing for the preference dividend (£187,500) and maintaining the dividend on the ordinary shares at 3 per cent. (absorbing £150,000) the balance carried forward is £6.128 higher at £165,137. The value of investments stands in the balance-sheet at £10,571,062, after deducting capital reserve account £2.003,153; a valuation of these at March 31st gives an amount of £10.423,020. The directors do not consider any provision is necessary against a contingent liability of a subsidiary company in respect of a participation of £248,863 in German advances subject to standstill arrangements. In Athens the Electricity Company has completed the extension of the distribution network and the change-over of consumers to a.c. The number of consumers shows a satisfactory increase, having reached at the end of a year a total of 85,000; and, in spite of the depression in industry, sales of energy at 73,000,000 kWh show a small increase. In Spain construction work has been mainly in connection with the new 10,000-kW hydro-electric plant at Izbor, which it was anticipated would have been in operation before the end of 1932. The work has been further delayed by difficulties encountered in tunnelling, but completion should be effected within two or three months.

**The Electrical Finance & Securities Co., Ltd.**—The annual meeting was held on June 1st, when Mr. G. H. Nisbett (chairman), who presided, said that they were able to maintain the rate of dividend on the ordinary shares, although the capital invested in the business had recently been considerably increased. Their subsidiary undertakings during the past year had made satisfactory progress, and the results so far during the current year showed continued progress. Aggregating the business of their subsidiary companies, the following were the results for last year in comparison with those of the preceding year: Increase in number of consumers, 18 per cent.; in kW connected, 20 per cent.; in kWh sold, 11 per cent.; in gross revenue, 14 per cent.; and in the total of reserves, 21 per cent. Suggestions had been made that the company should sell its interest in certain undertakings consequent on the local authorities having the right to purchase the undertaking. Such of these rights, however, as applied in the near future carried the obligation to purchase on goodwill terms, and it was not thought likely that the company would suffer appreciably in the event of the exercise of the purchasing powers. The directors were giving careful attention to the position. They had decided to reduce the price of electricity in certain districts as from March 31st last.

**The British Electric Traction Co., Ltd.,** reports a net profit for the year ended March 31st last of £245.123, after providing for debenture interest, a decrease of £9,192, as compared with 1931-32. It is proposed to pay a final dvidend of 2½ per cent. on the deferred ordinary stock, making 5 per cent. for the year, and out of the balance of £75,968, it is proposed to capitalise £40,578 and apply it in paying up in full 40,578 deferred ordinary shares of £1 each which will be distributed among the holders of the deferred ordinary stock. These fully paid shares will be converted subsequently into deferred ordinary stock. Subject to the proposed distribution to the deferred ordinary stockholders being approved, the holders of preference stock will be entitled to a further dividend of 2 per cent., making a total dividend of 8 per cent. for the year. The capital was increased during the year by the issue of 202,889 deferred ordinary shares of £1 each, which have since been converted into deferred ordinary stock.

The company is to hold an extraordinary general meeting on July 14th to consider a resolution to convert 40,578 deferred ordinary £1 shares, numbered 472,372 to 512,949, inclusive, into £40,578 deferred ordinary stock, ranking in all respects *pari passu* with the existing deferred ordinary stock.

**Ruston & Hornsby, Ltd.,** report a loss of £76,123 for the year ended March 31st last, after providing for losses on exchange and other contingencies and taking into account reserves available for such purposes, as against £119,262 in the preceding year. The debit balance brought in is £43,342, making the deficit balance to go forward £119,465. The report states that stocks of materials and finished stocks of machinery have been taken at cost price or under. Buildings, plant and machinery have been maintained out of revenue, but it has again been necessary to place the annual charge for depreciation against capital reserve account. There has been no increase in the volume of business, the improved result having been obtained by means of further economies.

**The Wellman Smith Owen Engineering Corporation, Ltd.,** held its annual meeting on June 1st. Mr. W. N. Drew (chairman), who presided, in the course of his speech, said that very heavy reductions in overhead charges had been made in the previous year; these had been maintained, and every effort was continuing to be made towards economy in operating the business. Nearly half the current year had already gone by, and there were so far very few indications of an increased volume of work for their shops. However, with the much increased activity on new projects they might confidently hope that a satisfactory volume of work was not far distant, and they were ready and determined to get their share of that work.

**The Brush Electrical Engineering Co., Ltd.,** states that after providing for general charges, maintenance, depreciation and debenture interest there was a deficit of £67,091 for the year ended December 31st last. The severe reduction of business suitable to the company's plant, together with the general fall of market prices, has resulted in a decline of turnover and a slight trading loss. New lines of manufacture are constantly being investigated, but these did not bring any benefit during last year. The sum of £6.158 was spent on capital account during the year. Meeting: June 12th.

**Telephone Rentals, Ltd.,** reports a net profit for the year ended May 31st last of £42,452, as compared with £44,614 in the preceding year, which with £12,916 brought in makes £55,370 available. General reserve receives £10,000 (against £20,000), and it is proposed to pay a final dividend of 4½ per cent., less tax, making 7 per cent. for the year (against 6½ per cent.), leaving £13,870 to be carried forward. Meeting: June 12th.

**The Electric Construction Co., Ltd.,** reports a net profit for the year ended March 31st last, including £6.768 profit on investments realised, of £12,845, as compared with a loss of £14,634 in the preceding year. To this is added £6,923 brought in, making £19,767. The preference dividend is paid and £15,373 is carried forward. Meeting: June 9th.

**The Kalgoorlie Electric Power & Lighting Corporation** earned a profit of £22,471 (against £22,426) in 1932. To this is added £2,157 brought forward and against the total is charged £3,643 for income tax and £10,000 for depreciation reserve. The ordinary dividend is maintained at 6 per cent. and £3,238 is carried forward. Meeting: June 15th.

**Kolster-Brandes, Ltd.**—At this company's annual meeting on June 2nd, the chairman (Mr. S. Wilding Cole) referred to the loss of £12,234 during the ten months' working and said that substantial economies had been effected resulting in a saving of £25,000 as compared with the corresponding period of last year.

**The Great Northern Telegraph Co. (of Denmark), Ltd.,** has declared an interim dividend of 2½ per cent.

# Stocks and Shares

TUESDAY EVENING.

THE World Economic Conference which opens in the Geological Museum at Kensington on Monday in next week is attracting so much attention in advance that optimism is moved to wonder whether it will achieve what is hoped—rather than expected—from its deliberations. The stock exchanges are inclined to inquire a little coldly into the prospects of a conference composed of such conflicting interests. One good effect it has already had is a strengthening of prices for commodities and for base metals. Rubber shares and tin shares have been buoyant. To the ordinary man, the main interest in the Conference lies in the attitude which this country, America and France will adopt in relation to war debts and disarmament. Many people hold that so long as war debts overhang the world, the wheels of international industry cannot revolve with any marked or sustained degree of freedom.

## The Industrial Boomlet

These matters have, of course, a close bearing upon stocks and shares such as those with which financial columns are concerned. Investment securities carrying fixed rates of interest and dividend are standing at levels so high that any indication of trade revival has the inevitable result of diverting capital from the stocks and deflecting it towards ordinary and deferred issues. This is the reason for the mild boomlet that now characterises various sections of the industrial market. Prices of gilt-edged stocks have recently been declining, although this tendency has left untouched the market for shares in the London electricity supply companies. A lively gamble sprang up in South African gold mining shares and, upon its being abruptly checked by taxation fears, the gilt-edged list recovered. But, as just noted, electricity supply shares have looked on, almost changelessly, at these cross-currents of finance.

## Manufacturing and Equipment Shares

It may be that the shares of companies connected with the manufacturing side of the electrical industry do not lend themselves to the speculative fancy, but, for whatever reason, the fact remains that this particular section has not yet come into popular favour. Dividend reductions by Crompton Parkinson and by Siemens appeared to attract more notice than the maintenance of their dividends by Callender's, British Insulated, and others. Callender's profits of £277,800 are £3,100 better than those of 1931. The company is paying a dividend of 15 per cent. on its ordinary shares for the fourteenth year in succession, and at the present price the yield on the money, allowing for accrued dividend, is 5¼ per cent.—quite a good return from an investment of this nature. British Insulated give barely 4¼ per cent. Henley's £4 18s. per cent. to the investor who buys the shares at to-day's prices.

### Brush and Cromptons

The Brush Company's report is a lamentable document, disclosing a trading loss on last year's working of £13,650. The balance-sheet shows a deficit of £67,000, and this has been deducted from the reserve, making the latter £153,529. The price of the stock remains about 40; there was a little bargain-hunting in the neighbourhood of 42; possibly it is thought that the company is within sight of a turn in its long lane of misfortunes. The last dividend paid on the ordinary stock was in May, 1931. Crompton Parkinson ordinary remain flat at 17s. 6d. upon the reduction from 10 per cent. to 6 per cent. in the interim dividend on the ordinary and the "A" ordinary shares, given in last week's issue on page 797. The six per cent. preference have failed to rally from their slump to 20s.: the 8 per cent. preference are 30s. Last week's official price of the latter, 23s. 9d., looks like a mistake. Telephone Rentals are better at 6s. 6d., the dividend, making 7 per cent. for the year, going against 6½ per cent. for the previous twelvemonth. Telephone Properties keep very steady at 18s. 9d. and the 8 per cent. preference are 23s. 9d.

### Home Railway and Transport

Such glorious weather as that which blessed the Whitsun holiday would have been followed, as the night the day, by rises in home railway stocks had Stock Exchange conditions been the same as those of pre-war days. But railways stocks are no longer governed, at any rate directly, by the climate, and the reason for a two-point rise in Metropolitan consolidated stock lies in the improvement amongst gilt-edged securities. This affects the London Passenger Transport stocks that have yet to be born into the market, but in which the buyer can secure an interest through stocks and shares that will be later on exchangeable for the former issues. Underground Electric Railways shares are dull, at a guinea, the impression gaining ground that the recent cut in petrol may shortly be replaced by a return to the prices previously current.

Yorkshire (West Riding) Electric Trams are a better market at 9s.

### Cables and Wireless

After its fall last week of 7½ points, the preference stock of Cables & Wireless has rallied a trifle to 76½. Both the ordinary stocks have small recoveries to their credit. It cannot be said, however, that there has been any great mitigation of the disappointment which arose from the chairman's announcement as to there being no dividend on the preference stock in September this year. Here, again, the coming Economic Conference may provide a bull point if the delegates act in such manner as to encourage revival of trade throughout the world. The recovery in Cables & Wireless did not suffice to stop the fall in Globe Telegraphs. The ordinary are back to their par level of 10; the preference, also £10 shares, are 5s. easier at 11½. Marconi Marines have gone back to 31s. 3d., but the Anglo-American Cable stocks remain firm. On the other hand, Great Northerns are £1 down at 28.

### Dollar Stocks

American and other dollar stocks are travelling upon a very switchback track. The new President is bent upon a policy that will raise the prices of commodities. Departure of the U.S.A. from the gold standard is part and parcel of the campaign. The first effect had an electrifying influence upon quotations for stocks and shares, but enthusiasm was met by profit-taking sales. After these, there came a fresh forward movement. American Telephone & Telegraph stock at 152½ has gained 2½ on top of the 8 points it rose last week. International Telephone & Telegraphs have been a lively market, and jumped 4½ to 22. (A stranger coming into the American market of the Stock Exchange might well be perplexed at the lusty shouts of "I.T. and T!") Of the other dollar stocks, it may be mentioned that advances are shown in Consolidated Gas & Electric of Baltimore at 75, Shawinigans at 17½, and Power Corporation of Canada at 16. Mexican Light & Power common are 2½ higher at 14½. Brazilian Tractions spurted to 16. But the principal honours in the group of dollar issues have fallen to Western Union shares. These were obtainable before the holiday at about 55; on Tuesday in this week the price was 74½ bid. Postal Telegraph & Cable 5 per cent. debenture stock at 37½ and the 25-year collateral trust bonds at 52½ have also shared in the strength of the dollar stocks.

### Miscellaneous Matters

The new trade agreement with the Argentine Republic has proved a stimulus to hopes of better times in that country. Anglo-Argentine Tramways stocks have been in some request from speculators prepared to take a long view. The 5 per cent. debenture stock is 2½ higher at 12½. In the Home traction issues, British Electric Traction deferred stock is 15 better at 315, the dividend being again 5 per cent., plus a capital bonus of 10 per cent. The company's net revenue is £9,000 down on the year—not a serious matter for the B.E.T. Tokyo Electric sixes are up 5 points, thanks to the more confident feeling now current in regard to Japanese investments of all kinds. Electrical Finance & Securities hardened to 3½, and the 7 per cent. preference to 29s. upon the increased profits secured in 1932. The iron and steel market is uncertain in tone. Babcock & Wilcox are 6d. down at 34s. 6d. Rubber shares have been buoyant because of a rise in the price of the product.

## Share List of Electrical Companies

| | Nom. | Approx. Dividend. 1931. | 1932. | Price, June 6. | Rise or Fall. | Yield. p.c. £ s. d. |
|---|---|---|---|---|---|---|
| **HOME ELECTRICITY COMPANIES.** | | | | | | |
| Bournemouth and Poole | 1 | 15 | 15 | 73/9 | — | 4 1 4 |
| Brompton Ordinary | 1 | 8½ | 7 | 32/6 | — | 4 6 2 |
| Central Electricity 4½% Deb. | Stock | 4½ | 4½ | 105xd. | −½ | 4 5 9 |
| Charing Cross Ordinary | 1 | 8d | 7 | 33/6 | — | 4 3 7 |
| Chelsea | 1 | 8½ | 7 | 32/6 | — | 4 6 2 |
| City of London | 1 | 10 | 10 | 33/6 | — | 4 3 7 |
| Clyde Valley | 1 | 7 | 7 | 35/- | — | 4 0 0 |
| County of London | 1 | 10½ | 10½ | 53/3 | — | 3 19 2 |
| Edmundsons' 7% Pref. | 1 | 7 | 7 | 30/6 | — | 4 11 10 |
| Elec. Dis. Yorkshire | 1 | 9 | 9 | 45/9 | — | 3 18 7 |
| Elec. Supply Corporation | 1 | 11 | 11 | 65/9 | — | 3 7 0 |
| Kensington Ordinary | 1 | 8 | 7 | 33/- | — | 4 4 10 |
| Lancs Light and Power | 1 | 7 | 7 | 31/3 | −⅛ | 4 9 7 |
| London & Home Counties 4½% Deb. | Stock | 4½ | 4½ | 109 | — | 4 3 4 |
| London Electric | 1 | 9 | 7 | 32/6 | — | 4 6 2 |
| Metropolitan | 1 | 10 | 10 | 50/9 | — | 3 18 9 |
| Midland Counties | 1 | 7 | 7 | 35/- | — | 4 0 0 |
| Mid. Elec. Power | 1 | 8 | 8 | 38/3 | −6d. | 4 3 9 |
| North Eastern Electric Ordinary | 1 | 6 | 6 | 30/- | — | 4 0 0 |
| Do. 7% Pref. | 1 | 7 | 7 | 32/6 | — | 4 6 2 |
| Northampton | 1 | 10 | 10 | 50/- | — | 4 0 0 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 13½ | — | 4 10 7 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 29/6 | — | 4 1 4 |
| St. James' and Pall Mall | 1 | 8 | 7 | 32/6 | — | 4 6 2 |
| Scottish Power | 1 | 8 | 8 | 36/3 | — | 4 8 2 |
| South London | 1 | 8½ | 7 | 33/- | — | 4 4 10 |
| Urban Ordinary | 1 | 7 | 7 | 37/6 | — | 3 14 8 |
| Westminster Ordinary | 1 | 8½ | 7 | 32/6 | — | 4 6 2 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 18/9 | +⅛ | 8 0 0 |
| Yorkshire Elec. | 1 | 8 | 8 | 43/3 | — | 3 14 3 |
| **HOME RAILS.** | | | | | | |
| Central London Ord. Assented | Stock | 4 | 4 | 87½ | — | 4 11 5 |
| Metropolitan | „ | 2½ | 1½ | 72 | +2 | 2 5 2 |
| Do. District | „ | 4½ | 3 | 68½ | — | 4 7 7 |
| Underground Electric | 1 | 7 | 4½ | 21/- | −6d. | 4 5 9 |
| **TELEGRAPH AND TELEPHONES.** | | | | | | |
| American Tel. & Tel. | $100 | 9 | 9 | 152½ | +2 | 5 18 0 |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 105½ | — | 5 13 10 |
| Do. Def. | „ | 1½ | 1½ | 23½ | — | 6 7 8 |
| Cables & Wireless 5½% Pref. | „ | 2¾ | 2¾ | 76½ | +1 | 3 11 10 |
| Do. A 7½% Ord. | „ | — | Nil | 26 | +1 | — |
| Do. B Ord. | „ | — | Nil | 11 | +1 | — |
| Globe Tel. and T. Ord. | 10 | Nil | 2½ | 10 | −½ | 2 10 0 |
| Do. do. Pref. | 10 | 6 | 6 | 11½ | −½ | 5 4 4 |
| Great Northern Tel. | 10 | 20 | 20 | 28 | −1 | 7 2 10 |
| Marconi-Marine | 1 | 10 | 7½ | 31/3 | −9d. | 4 16 0 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 2½ | — | *4 1 8 |
| **HOME AND FOREIGN TRAMS, ETC.** | | | | | | |
| Anglo-Arg. Trams First Pref. | 5 | — | — | 5/- | — | — |
| Do. do. 2nd Pref. | 5 | — | — | 1/9 | — | — |
| Do. do. 5% Deb. | Stock | — | — | 12½ | +2½ | — |
| British Electric Traction Def. Ord. | „ | 5 | 5 | 315 | +15 | — |
| Do. do. Pref. Ord. | „ | 8 | 8 | 134 | — | 5 19 5 |
| Brazil Traction | 100 | — | — | 16 | +1½ | — |
| Brit. Columbia Elec. Rly. Pce. | Stock | 5 | 5 | 102½ | — | 4 19 6 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 17/6 | — | — |
| London United Tram Deb. | Stock | 4 | 4 | 75½ | — | 5 6 0 |
| Mexico Trams. 5% Bonds | — | 5 | 5 | 36½ | — | 13 14 0 |
| Mexican Light Common | 100 | Nil | Nil | 14½ | +2 | — |
| Do. 7% Pref. | 100 | 7 | 7 | 15 | — | — |
| Do. 1st Bonds | — | 5 | 5 | 64½ | — | 7 15 6 |
| Victoria Falls Ord. | 1 | 15 | 15 | 85/- | — | 3 10 7 |
| Yorkshire (West Riding) | 1 | Nil | Nil | 9/- | +1/- | — |
| **MANUFACTURING COMPANIES.** | | | | | | |
| Assoc. Elec. Ord. | 1 | 4 | 4 | 17/6 | — | 4 11 5 |
| Do. Pref. | 1 | 8 | 8 | 28/3 | — | 5 13 3 |
| Babcock & Wilcox | 1 | 14 | 9 | 34/6 | −6d. | 5 4 4 |
| British Aluminium Ord. | 1 | 5 | 5 | 27/6 | — | 3 14 1 |
| British Insulated Ord. | 1 | 15 | 15 | 67/6 | — | 4 9 3 |
| Brush Ord. | Stock | Nil | Nil | 40 | — | — |
| Callender's | 1 | 15 | 15 | 2¾ | — | 5 4 2 |
| Do. 6½% Pref. | 1 | 6½ | 6½ | 28/0 | — | 4 10 5 |
| Crompton Parkinson Ord. | 5/- | 22½ | — | 17/6 | — | 6 8 7 |
| Do. 8% Pref. | 1 | 8 | 8 | 30/- | +6/3 | 5 6 8 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 24/6 | — | 6 2 5 |
| Do. 5% Deb. | Stock | 5 | 5 | 102½ | — | 4 17 7 |
| Electric Construction | 1 | Nil | Nil | 10/- | — | — |
| Enfield Cable Ord. | 1 | 25 | 25 | 4¾ | — | 5 11 1 |
| English Electric | 1 | Nil | Nil | 7/6 | — | — |
| Do. do. Pref. | 1 | Nil | Nil | 12/6 | — | — |
| Ever Ready | 5/- | 35 | 35 | 29/- | — | 6 0 8 |
| Ferranti Pref. | 1 | 7 | 7 | 24/3 | — | 5 15 6 |
| G.E.C. Pref. | 1 | 6½ | 6½ | 29/9 | — | 4 7 5 |
| Do. Ord. | 1 | 8 | — | 43/3 | — | 3 14 3 |
| Henley's | 1 | 30 | — | 6¼ | — | 4 18 0 |
| Do. 4½% Pref. | 5 | 4½ | 4½ | 5½ | — | 4 5 9 |
| India-Rubber | 1 | Nil | Nil | 2/6 | — | — |
| Johnson & Phillips | 1 | 5 | 5 | 18/3 | — | 5 9 7 |
| Siemens Ord. | 1 | 7½ | 6½ | 24/6 | −1/3 | 5 6 0 |
| Telegraph Construction | £1 | Nil | Nil | 18/3 | — | — |

* Dividends paid free of Income Tax.

# Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be abridged and printed, and all subsequent proceedings will be taken.

**1931**

28642. "Rheostats for use in electric calculating apparatus." M. E. A. Baule. November 28th, 1930. (392207.)

28674. "Electrical cells." A. G. L. Pennock. October 15th, 1931. (Cognate application 31973/32.) (392208.)

30721. "Short-wave radio communication systems." Marconi's Wireless Telegraph Co., Ltd., and G. A. Mathieu. November 5th, 1931. (Cognate application 32042/31 and 6628/32.) (392210.)

30751. "Electric supply for lamps in coal mines and like places." W. Cramp and N. H. Searby. November 6th, 1931. (392168.)

30829. "Electric transformers." British Thomson-Houston Co., Ltd., C. G. Mayo, and P. Mathews. November 6th, 1931. (392193.)

31052. "Automatic electric regulators." T. B. Somerville and Associated Electrical Industries, Ltd. November 9th, 1931. (392212.)

31060. "Electrical switches or circuit breakers with arc-extinction by magnetic blow-out." Allgemeine Elektricitäts-Ges. November 7th, 1930. (392156.)

31077. "Radio receivers." Plessey Co., Ltd., and C. E. G. Bailey. November 9th, 1931. (392158.)

31087. "Electrical heating pads or the like." I. Silberstein. November 8th, 1930. (392195.)

31167. "Means for controlling the intensity of current in electric lamps and other circuits." British Thomson-Houston Co., Ltd. November 10th, 1930. (392197.)

31184. "Electric connecting devices." F. E. Waller. November 10th, 1931. (392174.)

31265. "Method of electric resistance welding." F. Schull. November 11th, 1930. (392213.)

31320. "Apparatus for producing high-tension electrical current from a low-tension source." S. G. Brown. November 12th, 1931. (392199.)

31345. "Selecting and printing mechanism suitable for page-printing telegraph apparatus." Creed & Co., Ltd. (Teletype Corporation). November 12th, 1931. (392200.)

31346. "Directional antennæ." Standard Telephones & Cables, Ltd. February 3rd, 1931. (Addition to 353517.) (392201.)

31409. "Brushes and brush-holders suitable for dynamo-electric machines." Morgan Crucible Co., Ltd., and C. J. Hews. November 12th, 1931. (392204.)

32041. "Amplifiers for use in connection with television systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and L. E. Q. Walker. November 18th, 1931. (392229.)

32043. "Thermionic modulation systems." Marconi's Wireless Telegraph Co., Ltd., and N. M. Rust. November 18th, 1931. (392230.)

32979. "Circuit arrangements for telephone installations." J. Mellersh-Jackson. (Siemens & Halske Akt.-Ges.) November 27th, 1931. (392243.)

33508. "Thermionic valve circuits for use in systems such as electric signalling or control systems." General Electric Co., Ltd., F. B. Willis, and E. P. L. Westell. December 3rd, 1931. (392247.)

34119. "Electric selective control systems." Barr & Stroud, Ltd., and J. W. French. December 9th, 1931. (392255.)

34489. "Fusible electric cut-outs." British Insulated Cables, Ltd., H. H. Lord, and F. J. Brislee. December 12th, 1931. (392258.)

34985. "Methods of electrically insulating metals." International General Electric Co., Inc. December 17th, 1930. (392260.)

35081. "Dynamo-electric machines." Electromersible Motors & Pumps, Ltd., and T. L. R. Cooper. December 18th, 1931. (392261.)

35751. "Protection of electrical apparatus." Elektricitäts-Akt.-Ges. Vorm. W. Lahmeyer & Co. December 27th, 1930. (392268.)

36063. "Electric supervisory signalling systems and apparatus therefor." R. C. Graseby. December 31st, 1931. (392272.)

**1932**

1045. "Automatic telephone systems." Siemens Bros. & Co., Ltd., W. G. Patterson, and D. P. Long. January 13th, 1932. (392280.)

2201. "Automatic telephone systems." General Electric Co., Ltd., and R. M. Hamilton. January 25th, 1932. (392288.)

3573. "Electric disconnecting or fuse boxes and the like." A. F. M. Gatrill. February 6th, 1932. (392292.)

3618. "Röntgen diaphragms." R. Mannl. February 10th, 1931. (392293.)

3962. "Electrical measuring instruments." Evershed & Vignoles, Ltd., and G. F. Tagg. February 10th, 1932. (392296.)

4251. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and A. H. Maggs. February 12th, 1932. (392299.)

4826. "Variable electric resistances." General Electric Co., Ltd., and S. G. Hunter. February 18th, 1932. (392307.)

6527. "Telephone systems." H. O. Ellis and B. Winch. March 4th, 1932 (Cognate application 18828/32.) (392317.)

6710. "Loud-speaking telephones or loud-speaker apparatus." W. W. Groves (Radiophon Ges.). March 5th, 1932. (392318.)

7275. "Thermally-operated electric current interrupters." L. Ludwig. March 11th, 1932. (392322.)

9004. "Electric time relays employing a conducting liquid stream." Shawinigan Chemicals, Ltd. December 1st, 1931. (392334.)

10232. "Apparatus for generating alternating currents of different frequencies." Landis & Gyr. Akt.-Ges. April 11th, 1931. (392344.)

11270. "Portable radio transmitter." Radioakt.-Ges., D. S. Loewe, and H. Eberhard. April 21st, 1931. (392347.)

13266. "Number indicating arrangements for the impulse transmitters of automatic telephone instruments." W. Greenberg. May 7th, 1932. (392356.)

16489. "Voltage control systems." British Thomson-Houston Co., Ltd. June 15th, 1931. (392367.)

18698. "Manufacture of high ohmic resistances and the like." G. Seibt. July 29th, 1931. (392376.)

19523. "Apparatus for the generation of alternating currents of different frequencies." Landis & Gyr Akt.-Ges. August 14th, 1931. (Addition to 392344.) (392380.)

19921. "Combination lock-switch for use in electrical circuits, and with particular application to motor vehicles." H. C. Dann and A. C. Pallot. July 14th, 1932. (392381.)

20826. "Television and like systems." Marconi's Wireless Telegraph Co., Ltd. August 15th, 1931. (392383.)

21349. "Electric fuses." International General Electric Co., Inc. July 28th, 1931. (392386.)

21451. "Installations for distributing modulated high- or medium-frequency carrier waves over a power network." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 5th, 1931. (392387.)

21549. "Electrical alarm or indicator for use on dredges or similar floating objects." D. H. C. Lye. July 30th, 1932. (392389.)

22224. "Thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. August 7th, 1931. (392391.)

22751. "Tubular incandescent electric lamps." M. Deghenghi. August 13th, 1932. (392394.)

25409. "Alternating-current motors, more particularly for electric clocks." A. W. Haydon. September 16th, 1931. (392405.)

25667. "Transmission systems for ultra-short waves." International Communications Laboratories, Inc., and R. H Darbord. September 15th, 1932. (392406.)

26025. "Telephone and like exchanges." F. Rumpf. September 19th, 1931. (Addition to 16582/32.) (392409.)

26290. "Intermediate frequency coupling system for a superheterodyne receiver for wireless signalling." Hazeltine Corporation. February 13th, 1931. (Divided application on 32329/31.) (392411.)

26930. "Electric cables." H. Rost. September 28th, 1932. (392416.)

27184. "Electrolytic condensers." Elektricitäts Akt.-Ges. Hydrawerk. September 30th, 1931. (392417.)

27520. "Lighting apparatus." G. Main. November 4th, 1931. (392422)

27701. "Photographic printing by ultra-violet light." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 9th, 1931. (392424.)

27718. "Very short-wave electrical oscillations generating arrangements." Telefunken Ges. für Drahtlose Telegraphie. October 5th, 1931. (392425.)

28847. "Electric oscillation generators." British Thomson-Houston Co., Ltd. October 15th, 1931. (392436.)

29019. "Electric measuring devices." British Thomson-Houston Co., Ltd. October 16th, 1931. (392438.)

29029. "Electro-dynamic speakers." W. J. Tennant (Rola Co.). October 17th, 1932. (392439.)

30426. "Electric switches provided with arc quenching means operating upon the expansion principle." Siemens-Schuckertwerke Akt-Ges. February 25th, 1932. (392445.)

30649. "Control apparatus for combined electric lighting and heating or like installations." A. C. Johnson. October 31st, 1932. (Addition 339752.) (392448.)

30692. "Alternating-current electro-magnets especially for remote control circuit breakers." Schiele & Bruchsaler-Industriewerke Akt.-Ges. November 2nd, 1931. (392449.)

32323. "Radio television and like receiving systems." Marconi's Wireless Telegraph Co., Ltd. December 26th, 1931. (392456.)

33756. "Feeding of a rectifier from a twelve-phase system." Akt.-Gesellschaft Brown, Boveri et Cie. November 30th, 1931. (392463.)

34062. "Radio receivers." Telefunken Ges. für Drahtlose Telegraphie. December 1st, 1931. (392466.)

34450. "Device for adjustment of tuning condensers or other tuning members in radio receivers." N. Hansen. December 5th, 1931. (392469.)

34984. "Control devices and methods for gas discharge tubes with positive column for television purposes." Fernseh Akt.-Ges. December 12th, 1931. (392472.)

35164. "Rubber-covered sheet-steel cans for electric accumulators containing alkaline electrolytes." Britannia Batteries, Ltd. December 12th, 1931. (392474.)

**1933**

378. "Electrical condensers." Elektricitäts-Akt.-Ges. Hydrawerk. January 5th, 1932. (392486.)

617. "Electric coupling plugs." C. E. Gilbert. January 8th, 1932. (392487.)

700. "Portable electric lamp with semi-automatic control." P. Lindet and R. E. Hochon. January 9th, 1932. (392488.)

1453. "Thermal time relays for controlling the auxiliary windings of induction motors." International General Electric Co., Inc. January 16th, 1932. (392490.)

4472. "Interrupters of electric ignition devices." R. Bosch Akt.-Ges. April 25th, 1932. (392499.)

# Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 31st :—

Tell-O-Talker. No. 539346. Class 8. Telephonic and radio-telephonic apparatus.—Cetex, Ltd., 19, Grosvenor Place, Westminster, S.W.1.

Fevtherm. No. 540794. Class 11. Contrivances (not medicated) for use in medical diathermy.—Watson & Sons (Electro-Medical), Ltd., 43-47, Parker Street, Kingsway, W.C.2.

# New Work for Contractors

## Particulars of new works and building schemes for the use of electrical installation contractors and traders

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Accrington.**—Houses (18), Laneside Estate; borough engineer.
**Allhallows-on-Sea** (ROCHESTER).—Hotel; Rice & Son, builders, Margate.
**Asnington.**—Houses; G. Beaty, U.D.C. surveyor.
**Ashton-in-Makerfield** (LANCS).—Houses (60); U.D.C. surveyor.
**Bargoed.**—St. Margaret's Church, Gilfach (£3,000); H. Teather, architect, Cardiff. Mr. Williams, builder, Glynbargoed.
**Barking.**—Central clinic (£4,995) for E.C.; J. & R. Rooff, Ltd., builders.
**Barnstaple.**—Houses (18), Oakleigh Road, for the Voluntary Housing Association; Oliver & Son, architects.
**Barrow-in-Furness.**—Shop and offices, 179, Dalton Road; Saxone Shoe Co., Ltd. Wards, Devonshire Hospital; borough engineer.
**Beddington and Wallington.**—Public offices (£28,000); U.D.C. surveyor.
**Billingham.**—Houses (15), Sunnybrow Estate, for Harland & Parker.
**Birkenhead.**—Flats, St. Mary's Gate (£6,500); borough engineer.
**Blackpool.**—Estate development, Fleetwood Road; Chadwick & Co. Estate development, Arnott Road, for Hogarth & Pollard; Halstead Best.
**Bolton.**—Houses (60), Little Hulton (electrical equipment); F. Annable, Ltd., builders, 73, Hyde Road, West Gorton, Manchester.
**Brighton.**—School, Whitehawk (£15,700); director of education.
**Burnham** (BUCKS).—Houses (19), Bath Road; P. Ellis & Co.
**Cambridge.**—University premises (£12,000); Parnell & Son, builders, Rugby.
**Carshalton.**—Houses (76); R. S. Davey, U.D.C. surveyor.
**Chelmsford.**—Flats (36), New Writtle Street; Dr. K. S. Storrs. Café and flat, Princes Road; W. J. Wade & Co.
**Cookley** (KIDDERMINSTER).—Houses (20), Austcliffe Lane, for Ben Wall.
**Darlington.**—Houses (33), various sites; Dunn and Dunwell, builders, Arden Street.
**Devonport.**—Shops and houses, William Street; Cohen & Fredman.
**Devonshire.**—School, Lapford, for E.C.; B. S. Miller, clerk, Exeter.
**Dorchester.**—Houses (16); F. T. Maltby, R.D.C. architect, Dorchester.
**Dorking.**—Estate development, London Road; T. R. W. Bray.
**Edinburgh.**—Houses for Scottish Provident Property Company; F. Wood, architect, 73, George Street. Block of shops and houses; J. Miller, builder, 88, Hanover Street.
**Essex.**—Schools, Wickford, Chingford (£11,852), and Tilbury (£23,496), for E.C.; J. Stuart, county architect, Chelmsford. School, Hornchurch (£6,277); W. J. Wade, builder, Chelmsford. School, Clacton (£6,407); C. Deaves, builder, Bures.
**Ewell.**—Estate development, By-pass Road; F. Telling.
**Farnham** (SURREY).—Central laundry (£11,500); county architect, Kingston.
**Fleetwood.**—Elementary school for St. Wulstan's Church, Poulton Road (electrical equipment); R. Mercer, architect, 11, Chapel Street, Preston.
**Folkestone.**—Operating theatre, borough sanatorium; borough engineer.
**Gillingham** (KENT).—Development of estate, Barnsole Road; Vinall & Chappell, 87-101, High Street.
**Guildford.**—Cinema, Connaught Hotel; H. Ashenden. Development of Winterhill Estate, London Road; Armstrong & Co. Shops and flats, London Road and Epsom Road; Greater London Estates Development Co., Ltd. Extensions, Council offices, with electrical work (£6,350); J. W. Wilton, R.D.C. surveyor.
**Halifax.**—R.C. church, Pelham; Rev. Father Russell, St. Mary's.
**Hanley.**—Generating room, Palace Cinema; Cinema Co.
**Heckmondwike** (YORKS).—Houses (30), Leeds Old Road, for A. Schofield.
**Hetton** (DURHAM).—Houses (87); U.D.C. surveyor.
**Hornchurch** (ESSEX).—Estate development (7,000 houses); Richard Costain & Sons, Ltd., Croydon.
**Hull.**—Buildings, Winestead Mental Colony (£40,000); city architect.
**Irish Free State** (CORK).—Houses (32), Ashburton, for St. Christopher's Commercial Utility Society, Ltd.; J. Barry, architect, Glenview, South Douglas Road.
**Isle of Wight.**—Extensions, including nurses' block, at Poor Law Institution (electrical work) for P.A.C.; clerk, Newport.
**Keighley.**—Estate development, Greenhead Road; Cliff Castle Estates.
**Kendal** (WESTMORLAND).—Slum clearance scheme (£133,000); borough engineer.
**Kettering.**—Stores, Weldon, for the Industrial Co-operative Society, Ltd., King Street (electrical installation); L. G. Ekins, C.W.S., Ltd., 99, Leman Street, Whitechapel, London, E.
**Kingston.**—Reconstruction of railway station; Southern Railway Co.
**Kirkcudbright.**—Reconstruction of Johnston School, for County E.C.; W. A. Mackinnell, architect, Town Hall.
**Leeds.**—Institute, Middleton Housing Estate; Estate Tenants Association. Reconstruction of premises, King Street and Park Place, for Wilkinson & Warburton, Ltd., 46, West Street (electrical installation); J. T. Wright & Son, builders, 35, Skinner Lane.
**Leek.**—Houses (60); W. J. Simms, Sons & Cooke, Ltd., builders, Birmingham.
**London.**—(SOUTHGATE).—Houses (16), Waterfall Road; F. Bate. Eight shops, The Broadway; T. Woolnough, architect. Additions to Holy Trinity Church, Green Lanes; Alder, Turrill & Danvers. Extensions, Green Lanes; London Co-operative Society, Ltd.
**Maidenhead.**—Block of shops and offices, King Street; William Creed & Co., builders.
**Malling** (KENT).—Houses (26), Aylesford; S. L. Bundy, R.D.C. surveyor, West Malling.
**Manchester.**—Flats (130), Anson Estate; city architect. Library for the blind, Byrom Street, Deansgate (electrical installation); Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.
**Mansfield.**—Houses (18), Chesterfield Road; A. Farnsworth. Works extension, Rock Valley; Barringer, Wallis & Manners, Ltd.
**Melrose.**—Houses; J. & J. Hall, architects, Galashiels.
**Middleton.**—Junior school, Stannycliffe Road (electrical installation); P. Howard, architect, 88, Mosley Street, Manchester.
**Newmarket.**—Houses (42); A. E. Austin, R.D.C. surveyor, Exning Road.
**North Shields.**—Extensions to Congregational church; F. A. Childs, architect, 22, Ridley Place, Newcastle.
**Oldbury.**—Rebuilding Langley Cinema, Crosswells Road; F. S. Sandover, general manager.
**Oxford.**—Houses (22), Cricket Road; A. G. Simmons. Boot factory, St. Mary's Road; Oxford Co-operative Society, Ltd.
**Paisley.**—Extensions, Corporation Library and Museum (£4,000); burgh surveyor.
**Peterborough.**—Works extensions, Woodston, for Central Beet Sugar Co.; Mr. Cawley, chief superintendent.
**Plymouth.**—Houses (12), Mainstone Avenue; Curtis & Steer. Flats, St. Aubyn Street; city engineer.
**Radlett.**—Post office, Watling Street; H.M. Office of Works.
**Shipley.**—Houses (60), Crag Road Estate; U.D.C. surveyor. Houses (24), Taunton Street; Wm. Pitts & Sons. Works extension, Wrose Road; J. E. Briggs & Sons, Ltd.
**Staveley** (CHESTERFIELD).—R.C. Church, The Mount; priest-in-charge.
**Stirlingshire.**—R.C. school, Denny (£15,000); Master of Works, Education Committee, Stirling.
**Stockport.**—Houses (31); Thomas Davies & Son, builders.
**Stockton-on-Tees.**—Houses (52), Craigwell Estate; W. C. Cummings, architect, 77, Merrivale Avenue. Houses (24), Eynesham Grove; G. P. Stainsby, architect. Houses (16), Whitfield Road, Norton; T. F. Whitear. Estate development, Hallifield Street, Norton; Lane & Fox.
**Stoke-on-Trent.**—Development of Blurton Green Farm Estate; C. W. Ball.
**Sunderland.**—Hostel for nurses and domestic staff, Municipal Hospital (£25,000); T. P. Collinge, borough engineer.
**Teddington.**—Four shops, Stanley Road; Miss I. A. Dunton.
**Thames Ditton.**—Estate development, By-pass Road; Mr. Johnson, Station Road.
**Truro.**—Boarding school; A. J. Cornelius, architect, Truro.
**Tunstall.**—Development of Chell Lodge Estate for L. J. Cope; Mr. Yoxall, architect.
**Tynemouth.**—Houses (96), Ridges Estate; J. L. Beckett, borough engineer, Howard Street, North Shields.
**West Sussex.**—Two central schools, Shoreham & Southwick area; director of education, Chichester. Extensions, Chichester High School for Girls (£5,970); White & Sons, Ltd., builders, Littlehampton.
**Wick.**—Houses (150); burgh surveyor.
**Wimbledon.**—Development of Wimbledon Park Estate; J. W. Coleman & Sons.
**Wombwell.**—Extensions, printing works; P. A. Hinchliffe, architect, 40, Victoria Road, Barnsley.
**Workington.**—Five shops with flats, Murray Road, for J. H. Murray, Ellerbeck Road (electrical installations); J. Gilmore & Sons, builders, 196, Harrington Road.
**Worthing.**—Houses (22); A. Saunders, builder, Brighton.
**Wrexham.**—Houses (23), Aston Grove; borough surveyor.

## B.S.S. for Insulating Oils

THE British Standard Specification for insulating oils is quoted in practically every contract in this country for transformer and switch oil. The 1933 edition of the Specification embodies no changes as regards the physical properties of the oil, but introduces a new test for freedom from moisture. The old edition specified that the oil should be "sufficiently free from moisture" to satisfy the requirements of the Specification, but, apart from the electric strength test, there was no criterion of freedom from moisture. An additional test, in the form of a "crackle" test, has now been incorporated, but, owing to its somewhat unscientific nature, it is optional, to be applied only when specified by the purchaser. It is hoped that a definite technique may be evolved from experience, thus enabling a more scientific test to be established. A further important amendment to the Specification relates to the description of the method of carrying out the sludge test. This test has in the past been liable to produce slightly inconsistent results in different laboratories, but as the result of considerable research by the Electrical Research Association the causes of these inconsistencies have been discovered and the technique of the test modified accordingly. Copies of the Specification (B.S.S. No. 148, 1933) may be obtained from the British Standards Institution, Publications Department, 28, Victoria Street, S.W.1, price 2s. 2d. post free.